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ABSTRACT

This report of the proceedings of a conference on graduate education contains papers from plenary and concurrent sessions, information on awards presentations, information on the Council of Graduate Schools' (CGS) business meeting, copies of the CGS constitution and bylaws, and a CGS list of member institutions. constitution and bylaws, and a CGS list of member institutions. Titles of sessions and presenters are as follows: "The Role of Faculty in the Nurturing of Minority Scholars" (John Slaughter; Leonard A. Valverde); "Support Services for Graduate Students" (Anne N. Medicine; Debra W. Stewart); "Fund Raising and Graduate Deans" (Robert E. Gordon; Arthur C. Frantzreb); "Issues in Graduate Education in the Physical Sciences" (Homer A. Neal); "China and American Graduate Schools" (Li Mingde; Meng Yang; Halsey L. Beemer, Jr.); "Recruitment of Graduate Students" (Donald G. Dickason; Paul Bryant; Thomas P. Hogan; William H. Matchett); "Non-Faculty University Researchers and Graduate Programs" (Robert Bock); "Data Needs and Graduate Education Policy" (Daryl E. Chubin); "Interdisciplinary Programs, Centers and Institutes: Academic and Administrative Issues" (Donald Kash; Richard Attiyeh). (LPT)

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Proceedings of the Twenty-Seventh Annual Meeting

COUNCIL OF GRADUATE SCHOOLS

THEME

GRADUATE EDUCATION—
Communities of Scholars

December 1 - 4, 1987
Capital Hilton Hotel
Washington, D.C.

edited by Edna M. Khalil

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Board of Directors and Dean of the Graduate School
University of Minnesota

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COUNCIL OF GRADUATE SCHOOLS

27th ANNUAL MEETING

PROGRAM

TUESDAY, DECEMBER 1, 1987

CGS ANNUAL PRE-MEETING WORKSHOPS

Coordinator of Workshops: Dale R. Comstock, *Dean of Graduate Studies and Research, Central Washington University*

Graduate Information Systems
This workshop will focus on the nuts and bolts of collecting, analyzing and reporting data on graduate students and programs.

Faculty:
Anne C. Steele, University of North Carolina, Greensboro
Ellen Benkin, University of California, Los Angeles

Program Review and Evaluation
This workshop will focus on policies and procedures for academic review and evaluation of graduate programs at the master's and doctoral levels.

Faculty:
Suzanne Reid, Western Illinois University
John Nellor, University of Nevada, Reno

The Employment and Education of Graduate Teaching Assistants
This workshop will address administrative policies for the employment of TAs and the orientation and training of TAs including ITAS.

Faculty:
George G. Karas, Iowa State University
C. W. Minkel, University of Tennessee, Knoxville

PRE-MEETING SATELLITE SESSIONS

I. Graduate Education in the Health Sciences
Presiding
J. Palmer Saunders, University of Texas Graduate School of Biomedical Sciences at Galveston
Kenneth J. Roozen, University of Alabama at Birmingham
William O. Berndt, University of Nebraska Medical Center, Omaha

A. Multidisciplinary/Multidepartmental Graduate Programs
J. Dennis O'Connor, University of North Carolina, Chapel Hill

B. Combined Degree Programs
Sanford Miller, University of Texas Graduate School of Biomedical Sciences at San Antonio

C. Issues in Research Involving Animals
William F. Raub, National Institutes of Health
Discussants:
Al Chapman, Medical Center of the University of Kansas
Robert F. Dyer, Louisiana State University Medical Center
Peter W. Reed, Vanderbilt University

II. Graduate Education in Master's-Only Institutions
Presiding
Helen Cairns, Queens College of the City University of New York

A. Encouraging Research nd Scholarship among Faculty in Master's Only Institutions
Elaine Wangberg, California State University at Chico

B. The Professional Master's Program: Issues and Problems
Panel Discussion
W. Ray Ellis, Hardin-Simmons University
Robert Weinstein, Bradley University
Joyce W. Lawrence, Appalachian State University

WEDNESDAY, DECEMBER 2, 1987

9:00 a.m.
Welcome and Introduction

Plenary Session I
The Role of Faculty in the Nurturing of Minority Scholars
John Slaughter, Chancellor, University of Maryland, College Park
Johnnetta Cole, President, Spelman College

Leonard A. Valverde, Chairman, Department of Educational Administration, University of Texas at Austin

Presiding

Trevor L. Chandler, Associate Dean, University of Washington and CGS Dean in Residence

10:45-12 Noon

Concurrent Sessions

1. Issues in Graduate Education in Engineering

B. Bingham Cady, Professor of Nuclear Science and Engineering, Cornell University

Edmund T. Cranch, Granite State Distinguished Professor, the University System of New Hampshire

Presiding

Albert W. Spruill, Dean, School of Graduate Studies, North Carolina A&T State University

2. Support Services for Graduate Students

David E. Lopez, Associate Dean, Graduate Division, University of California, Los Angeles

Anne N. Medicine, Assistant Dean, Graduate Studies, Stanford University

Debra W. Stewart, Interim Vice President and Graduate Dean, North Carolina State University

Presiding

William H. Macmillan, Dean of the Graduate School, University of Alabama

3. Fund Raising and Graduate Deans

Robert Gordon, Vice President for Advanced Studies, University of Notre Dame

Roy Koenigsknecht, Dean of the Graduate School, Ohio State University

Arthur C. Frantzreb, Consultant in Philanthropy, Arthur C. Frantzreb, Inc.

Presiding

Russell G. Hamilton, Dean for Graduate Studies and Research, Vanderbilt University

12 Noon

Luncheon

An Address by Congressman Fortney (Pete) Stark (D-C A) on the Tax Status of Scholarship and Fellowship Technical Amendments

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Presiding
David S. Sparks, Vice President for Academic Affairs, Graduate Studies and Research, University of Maryland

2:00-3:15 p.m.
Plenary Session II
Issues in Graduate Education in the Physical Sciences

Norman Hackerman, Chairman, Scientific Advisory Board, Robert A. Welch Foundation
Jacqueline Barton, Professor, Department of Chemistry, Columbia University
Homer Neal, Chairman, Department of Physics, University of Michigan

Presiding
Lee B. Jones, Dean of Graduate College and Executive Vice President Provost, University of Nebraska

3:45-5:00 p.m.
Plenary Session III
Tax Policy and Federal Support for Research and Graduate Education: Comity or Chaos
John F. Jonas, Of Counsel, Patton, Boggs & Blow, Washington, D.C.
John C. Vaughn, Senior Federal Relations Officer, Association of American Universities

Presiding
Thomas J. Linney, Jr., Director of Government and Association Relations, Council of Graduate Schools

THURSDAY, DECEMBER 3, 1987

9:00-10:15 a.m.
Plenary Session IV
Ethics in Academe
Judith Swazey, President, The Acadia Institute
Barbara Mishkin, Associate, Hogan and Hartson

Presiding
Vivian A. Vidoli, Dean, Division of Graduate Studies and Research, California State University, Fresno

10:45-12 Noon
Concurrent Sessions

4. China and American Graduate Schools

Li Mingde, First Secretary for Science and Technology, Embassy of the People's Republic of China

Meng Yang, Graduate Student, Cornell University, and former Second Secretary, Office of Education, Embassy of the People's Republic of China

Halsey L. Beemer, Jr., Executive Director, International Advisory Panel, Chinese Development Project II, National Academy of Sciences

Presiding

Alison Casarett, Dean of the Graduate School, Cornell University

5. Recruitment of Graduate Students

Donald G. Dickason, Vice President of College and University Services, Peterson's Guides

Discussants

Paul Bryant, Dean of Graduate College, Radford University

William H. Matchett, Dean of the Graduate School, New Mexico State University

Barbara Solomon, Acting Dean of Graduate Studies, University of Southern California

Presiding

Larry J. Williams, Dean of Graduate School and Research, Eastern Illinois University

6. Non-Faculty University Researchers and Graduate Programs

Robert Bock, Dean of the Graduate School, University of Wisconsin-Madison

Frank Perkins, Associate Provost and Dean of Graduate School, Massachusetts Institute of Technology

Presiding

X. J. Musacchia, Associate University Provost for Research and Dean of Graduate School, University of Louisville

12 Noon

Luncheon

Presentation of Awards

Gustave O. Arlt Award in the Humanities

Presented by Gillian Lindt, Chairman of Arlt Award Committee, Dean of Graduate School of Arts and Sciences, Columbia University

CGS/University Microfilms International Distinguished Dissertation Award

Presented by William Johnson, Chairman of the Dissertation Award Committee and Dean of the Graduate School, University of North Dakota

2:00-3:15 p.m.
Plenary Session V
Data Needs and Graduate Education Policy
Ellen Benkin, Director, Institutional Research, Graduate Division, UCLA
Daryl E. Chubin, Project Director, Office of Technology Assessment

Presiding
Peter D. Syverson, CGS Director of Information Services

3:45-5:00 p.m.
Plenary Session VI
A National Study of the Master's Degree
Clifton F. Conrad, Professor of Educational Administration, University of Wisconsin-Madison

Presiding
Robert Holt, Dean of the Graduate School, University of Minnesota

FRIDAY, DECEMBER 4, 1987

9:00-10:15 a.m.
Plenary Session VII
Interdisciplinary Programs, Centers and Institutes: Academic and Administrative Issues
Donald Kash, George Lynn Cross Research Professor, University of Oklahoma
Richard Attiyeh, Dean of Graduate Studies and Research, University of California, San Diego

Presiding
Kenneth Hoving, Dean and Vice Provost for Research Administration, University of Oklahoma

10:45-12 Noon
Business Meeting

Chairman's Report
David S. Sparks, Vice President for Academic Affairs, Graduate Studies and Research, University of Maryland

President's Report
Jules B. LaPidus, President, Council of Graduate Schools

Resolutions
Other Business

Presiding
David S. Sparks, Vice President for Academic Affairs, Graduate Studies and Research, University of Maryland

Noon
Adjournment

SOME PLENARY SESSION SPEAKERS

John Slaughter
Chancellor
University of Maryland, College Park

Leonard A. Valverde
Chairman, Department of Educational Administration
University of Texas at Austin

Johnnetta Cole
President
Spelman College

Norman Hackerman
Chairman, Scientific Advisory Board
Robert A. Welch Foundation

Plenary Session I

Wednesday, December 2, 1987, 9:00 a.m.

THE ROLE OF FACULTY IN THE NURTURING OF MINORITY SCHOLARS

Presiding: Trevor L. Chandler, *Associate Dean, University of Washington* and *CGS Dean in Residence*
Speakers: John Slaughter, *Chancellor, University of Maryland, College Park*
Leonard A. Valverde, *Chairman, Department of Educational Administration, University of Texas at Austin*

John Slaughter

It is a great pleasure to join Drs. Chandler, Cole, and Valverde on this panel today to address a topic of compelling importance to all members of the higher education community and to the nation as a whole. The declining numbers of blacks in higher education in general and in our graduate schools, in particular, has become a crisis that every institution has a responsibility to address. All of you are familiar with the numbers that tell the story.

In every decade from 1900 to 1970, full-time black undergraduate enrollment doubled, from 0.3 percent in the early 1900s to 7 percent in 1970. The number of blacks enrolled in college increased steadily in the 1960s and in the early-and-mid 1970s partially in response to the expansion in federal support of higher education during that period.

In 1977, however, black enrollment began to plateau, and in 1983 there were 1,102,000 blacks enrolled in college, or 1,000 fewer than in 1977 (indicating a no-growth period for blacks during those six years). By contrast there was a 4.9% increase in the college enrollment of whites.

While the proportion of black 18- to 24-year-olds graduating from high school has never been higher, the proportion of black high school graduates enrolling in college has declined steadily in recent years—from 34 percent in 1976, to 30 percent in 1979, to 27 percent in 1983. A similar decline is noted in the degrees awarded. In 1979 and 1981 blacks constituted 13% of the college-age population and yet were awarded only 6.5% and 5.8% of the degrees respectively.

The trends are the same in graduate education. Black enrollment in graduate school has declined from more than six percent to 4.2 percent

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over the last five years. In 1983 out of a total of 31,190 doctorates awarded, only 1,000 went to blacks. By contrast in 1978, out of 30,850 total doctorates, blacks earned 1,100. Blacks are seriously underrepresented in the physical and life sciences, in engineering, and in the professions. Three-quarters of all doctorates earned by blacks are in education and social sciences.

The problem is equally distressing in professional education. For example, in 1974-75 blacks accounted for 7% of those accepted to medical schools. In 1984-85 that number was down to 6.1%. Moreover, in 1974-75, 43% of the blacks that applied to medical school were accepted. Ten years later only 40% of those that applied were accepted.

In my own field of engineering, 19 blacks earned Ph.Ds in 1979 and in 1983, the figure rose to 29. I wouldn't say we're on a roll. In 1985, U.S. universities awarded 4,500 doctorates in the physical sciences. Of these, forty-nine went to American blacks. Finally, 60 percent of all doctoral degrees to blacks in 1980-81 were awarded by ten percent of institutions that offer such degrees.

Black men have lost ground at every level. Any increases are due to greater participation of women. In fact, in the last ten years the number of black men attending college has grown by only 10,000 while the number of black women has increased by 85,000. Over 100,000 more black women than black men are attending college, and the gap is growing.

This country must remain committed to educating minority students and cannot allow its preoccupation with reducing the deficit to interfere with what should be a higher priority—an educated populace. A recent student aid study by the National Association of State Universities and Land Grant Colleges revealed that between 1981-84, the number of student aid recipients in public higher education declined 2.3%. The decline, however, in availability of student aid had a disproportionate effect on minorities because the proportion of minority recipients plummeted 12.4%. Furthermore, the federal investment at historically public black colleges was cut 4.2% in 1983 while majority institutions reported a 1.1% increase in student aid.

With the continued decline of student aid funding, it is anticipated that low income families will actually pay one-half of the real costs of higher education. If this prediction is borne out, it will have a devastating impact on historically black colleges and universities and their ability to recruit prospective students. As one jokester put it, "if college costs get much higher, anyone who can afford to go won't need to."

The dilemmas that confront minority students in general and historically black colleges and universities specifically cannot be solved by increases in student aid alone. While I see a continuing and expanding role for the federal government in supporting black students and colleges, I am not optimistic about the likelihood of turning back current policies and trends. While we work to hold the line on federal support, higher education must close ranks and attack some problems ourselves.

Research shows that the higher the quality of the undergraduate institution attended, the greater are the minority student's chances of earning a baccalaureate degree and of enrolling in graduate or professional schools. It is in the best interest of society as a whole and certainly of higher education to strengthen our historically black colleges as well as to strengthen programs for minorities in predominantly white institutions.

Historically black colleges have produced the overwhelming majority of black leadership in America today: 85 percent of the black doctors, 80 percent of black lawyers, more than 70 percent of black elected officials, and over 80 percent of black military officers. More than 50 percent of the black engineers in this country are graduates of the six black institutions with accredited colleges of engineering: Tuskegee, Prairie View, Southern, North Carolina A&T, Tennessee State, and Howard. Most of the blacks in the finest graduate schools in this country received their undergraduate educations in the predominantly black colleges.

Major research universities need to offer support in helping historically black colleges to develop the professional programs and the specialized majors needed to meet the challenges our students face in the future. For example, Jackson State University, in cooperation with the National Oceanic and Atmospheric Administration, has established the first atmospheric science department at an historically black college. It also has received support to maintain its marine science curriculum and to develop a sea grant research program. Morgan State University's Institute for Urban Research has undertaken research to bolster academic programs in science and technology. Florida A & M University created the first doctoral program at a public black college in pharmaceutical sciences.

Programs such as these give faculty members at predominantly white institutions the opportunity to work with talented black undergraduates and recruit them into graduate programs. These programs also allow undergraduate and graduate students to pursue advanced studies in science in supportive educational environments.

I wish I could offer you today some quick and effective methods for increasing the number of black Americans enrolled in our graduate schools. Unfortunately, none of the quick solutions work and some are even counterproductive. The sorry figures I cited earlier arise in part because blacks are not identified, recruited, and encouraged to attend universities and colleges. Many blacks are less prepared and more financially dependent. They lack role models for academic careers within their communities. They often face indifferent and sometimes hostile educational and social climates when they do enroll in our predominantly white institutions as undergraduate and graduate students.

To break these cycles requires massive doses of money, energy, and imagination. At a recent conference organized by the National Center for Postsecondary Governance and Finance and co-sponsored by the American Council on Education and the Education Commission of the

States, many speakers pointed to major research universities as the chief offenders in excluding minorities and in having weak affirmative action programs. The Center's associate director, Richard Richardson, criticized piecemeal approaches to recruit minority students and faculty. He proposed "a seamless fabric of efforts, extending over the entire institution."

My own recommendations would support this kind of effort. Every university campus must examine itself critically to determine how it can create an educational and social climate that will attract minority students and help them to succeed. Certainly, this means more money for such basic areas as minority graduate fellowships, but it also means coming to terms with the fact that equity and excellence are not mutually exclusive. It means recognizing that the Howard graduate may be as good as or better than the Harvard graduate for a teaching assistantship or faculty position. Those recommending the candidate from Howard may not be as well plugged into the "old boys" network, but they can speak as articulately and thoroughly to the candidate's qualifications if we take the time to listen.

We need to consider as faculty members and administrators how often we accept or seek the invitation to speak and work with faculty members and students at the Howards and the Tuskegees and the North Carolina Centrals of the nation when we can also entertain invitations from the Harvards and the Tulanes and the Berkeleys. Ronald Reagan's visit to Tuskegee last spring to tell America that we need more blacks in the sciences was a front page story; it was also his first official visit to a traditionally black college. The same message would have been equally appropriate at Princeton, but I doubt that Reagan would have delivered it there.

When we say that our institutions are committed to affirmative action, we need to question what that commitment means. I wish there were more blacks on the faculty and fewer in the affirmative action offices. It is important that blacks chair economics and elementary education departments as well as Afro-American studies programs.

I am exceedingly proud of the fact that the University of Maryland College Park, one of the nation's major land grant campuses, had its highest full-time first time black freshman enrollment this fall—over 14% of our entering class. This figure and the promising futures it represents is particularly impressive in light of the national decline in black enrollment and the increase in the quality of our freshman class as measured by standardized test scores. While I would not want to take personal credit for this success, I do believe that my visibility in a leadership role reminds the campus and the community of our commitment to equity and excellence.

Finally, we must be ever vigilant about the traditional exclusiveness of our curricula in every area, including the humanities. As long as Afro-American studies, women's studies, and third world studies are optional areas from which our students choose electives, our curricula from music to mathematics will be western white man's studies. No discipline, no matter how apparently objective, is free of gender and racial bias. We must

rethink our core and the connections we make for our students, and we must undertake the difficult task of re-educating ourselves as well.

Last spring I joined the head of our Afro-American program in teaching a course on "Black Americans in Science and Technology." One week I put the names of several famous black scientists on the board—David Blackwell, Edward Bouchet, Samuel Nabrit, Lloyd Ferguson, W. Lincoln Hawkins, Marguerite Thomas Williams—and we discussed the tremendous obstacles those people faced to make contributions and advances in their chosen fields. Several students pointed out that today while we are fortunate to be free of legislated oppression, there are still many subtle and not so subtle barriers to black success, particularly in the science and technology areas.

I shared something I call Slaughter's theorem with the class—"Black history is for white Americans. Math, physics, and chemistry are for black Americans." Admittedly that is an overdrawn thesis but it forces people to think. While they all agreed with the second part, some vigorously disagreed with the first, arguing that black history is for all Americans. Indeed, perhaps more than ever today young blacks need to appreciate the accomplishments of black pioneers like Washington and Carver, and, as important, receive the support and encouragement of contemporary role models. Moreover, the scientific community needs to look more closely at the contributions of blacks to scientific knowledge from ancient times to the present.

Administrators and faculty do not see this massive job of rethinking the criteria we use to judge one another and our students and of evaluating our disciplines and of those who have shaped them as traditional affirmative action areas. But unless we address these difficult issues, we will not see substantial increases in the numbers of blacks who can be recruited, accepted, and retained in our graduate schools.

Leonard A. Valverde

A new tomorrow is upon us, and this new day will be considerable in length. It will last well into the next century. Make no mistake, what we are addressing this morning has fundamental implications for higher education in the United States. To what am I referring?—the changing demographics. One, Harold Hodgkinson predicts that by the year 2020 one out of three persons will be an ethnic or racial minority person. Two, our most populated states—New York, California, Texas and Florida—will be majority minority populated. Three, our major metropolitan school districts are already majority minority. New York, Los Angeles, Atlanta, Dallas, San Antonio, Detroit, Philadelphia, etc. have eighty-five percent minority populations in their student bodies. But the issue is more than

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just numbers; it is character as well. Black children of tomorrow will be different from Black youth of today, just as Blacks are different from their predecessors. The same is true of Hispanics and American Indians. They will not want to shed their cultural ties, language or value systems as readily as some of us have had to do in order to enter the American mainstream. Consequently, if minorities are growing in numbers and holding on to their cultural roots, universities will have to change centrally to accommodate, to be functional and to survive this new wave.

Besides institutional change, what is at stake is the economic competitiveness of the United States. We have changed from an industrial to an information society. We are no longer going to be as dependent on natural resources, such as oil, as we will be on our human resources. Presently, twenty percent of jobs require a college education. By the 21st century, fifty percent of them will require a college education. Thus, what is at stake here is access to and retention of a new person in higher education. The issues I will address this morning are: talent identification and talent development. But, before I do, let me make a transition from the general to the specific with an interlude of thank yous.

I want to thank Jules LaPidus for commencing the Council of Graduate Schools 1987 conference with this particular plenary session. It reflects commitment, understanding, and enlightened leadership, which is very much needed by all our national organizations. Also, I give thanks to my committee colleagues for allowing me to represent them, particularly the Chair, Dean John B. Turner. Lastly, I want to publicly acknowledge the effective job being performed by Trevor Chandler as the Council of Graduate Schools' first minority Dean in Residence.

Let me turn now to speak of talent development. As we all know, faculty have two primary functions: first the creation of knowledge, better known as scholarship, which is emphasized via rewards and acknowledgements by the academy, and second, the primary function of talent development, usually referred to as teaching. The way we develop talent in postsecondary education is through various means of teaching, yet, teaching is secondary. That is, we usually do not honor it at the graduate level; we see it as necessary, but rarely is it rewarded to the degree that research is. It is, in fact, an underdeveloped function. The spotlight today is on talent development, particularly, on nurturing minority scholars.

Before I continue on the hows of talent development, let me reinforce that the leadership of our universities will have to develop incentives, provide encouragement, and continue to support faculty so that they may attend to this function. The SHEEO organization (States Higher Education Executive Officers) has stated the importance of making this a high and lasting priority. If we are to be successful in overcoming the problem of minority student attrition, faculty will have to try to do a better job at teaching. Faculty do listen for messages from presidents, chancellors and provosts. Where are the incentives? It is not as difficult to move faculty as we

might think: the carrot approach is still an effective way.

Talent development begins with talent identification. Identification of talent is critical and vital. Why? Basically, what we are talking about is incorporation of traditionally excluded populations. Incorporation begins with those who are the gate keepers. Faculty need to open the doors for minorities. Currently we are seeing that the doors, once opened, are beginning to close. The number of minorities enrolling and maintaining their good standing in higher education is dwindling. Of the present total graduate enrollment, only five percent are Blacks, three percent are Hispanics, and point four (.4%) percent are native Americans.

To open graduate education to minorities, faculty will need to involve themselves in the process of identification and recruitment. Depending on the institution, its mission, and the particular program, faculty need to participate to a greater degree in informal identification and recruitment. But more critical than behavioral involvement in identification, is the psychological revamping that will be required in the minds of faculty. Faculty will need to formulate a mind set of acceptance. To change faculty misperceptions and erroneous beliefs about minorities, we will need to extract from the minds of faculty some negative attitudes and erroneous stereotypes.

I have categorized the negative attitudes into four, albeit simplistic, classifications. The categories should be taken not as complete, but only as representative. I am sure different and better categories and examples can be generated with additional time by others. Before sharing these categories, let me begin with a note of disclaimer or caution. While I am speaking rather harshly of faculty, please do not think that I am all inclusive, nor am I depicting everyone to the same degree. There is a continuum of faculty going from those with enlightened views to those harboring ignorance.

Type One Negative Attitude: Unrealistic Expectations

Looking for the super Mex or Black super star, the exceptional person, the flawless individual, the almost perfect minority—that is what I refer to as unrealistic expectation, type one negative attitude. There is nothing wrong with looking for the best; but if you look *only* for the best, it eliminates many capable persons who can succeed in reaching their degrees.

Corollary one to Type One Negative Attitude is the converse of the super star syndrome. That is, the deficiencies of minorities are isolated and emphasized to their detriment or exclusion. Here the sum of the parts is greater than the whole. The more you examine the flaw under the microscope, the greater the defect becomes; consequently, the minority applicant is denied.

Corollary two relates to nurturing or retention. Faculty have unrealistic expectations about marginally admitted minority students being able to overcome their disadvantages. Faculty often assume and expect that such students can overcome decades of conditioning within a semester or an academic year.

Type Two Negative Attitude: Tokenism

Tokenism exists when a department has only one or at most a handful of minority students registered in its programs. I call this quota thinking. It reveals subconscious beliefs on the part of faculty about the capacity of minority students, i.e., that their ability is limited. Let only a few in, since the general understanding is that there is a paucity. Thus, if you have too many minority students in your program, the value of your program is cheapened or questioned since, again, the pool of talented minority is small.

Type Three Negative Attitude: Dual Standards/Treatment

With Type Three, faculty hold the notion that when they look at a minority student's folder, they are seeing a half *empty* glass compared with the majority student's folder which they see as a half *full* glass, resulting in the different treatment for the minority student. Second, because faculty believe minority students are provisional admits when they arrive in their classrooms, they treat them more cavalierly than they do other students.

Type Four Negative Attitude: Homogeneous Rule or Devaluing of Diversity

Faculty perceive minorities as being different, and being different is interpreted in their minds as being deficient. Diversity in minorities is not usually recognized; but when it is, it is devalued or seen as a hindrance to learning or to their socialization within higher education and society in general. Not only is there inter-diversity among various ethnic groups, but there is intra-diversity as well. For example, within the Hispanic community there are Mexican-Americans, Puerto Ricans, Cubans, South Americans, Central Americans, etc. Also in the American Indian community, there are the various tribes that have their own customs, language and ceremonies. Faculty must learn to celebrate and appreciate diversity as a strength rather than as a weakness.

After and beyond the psychological dimension and the identification phase, there is the behavioral dimension required by faculty. If we can remove or neutralize the negative attitudes from their minds, then faculty can begin to assume four types of roles which will help to nurture minority students through their graduate programs of study. Since talent development is two-fold, that is, cognitive and affective, I have developed four roles or a two-by-two matrix. Within the cognitive arena, the two roles that faculty can play are 1) teacher and 2) mentor. Within the affective development arena, faculty can play two roles as well, 3) friend and 4) sponsor. We should think of these four roles on a continuum. As with every continuum, there is a start and an end. At the start, the role is one of friend or sponsor and the functions are identification and recruitment. Moving along the continuum, the role to play by faculty is teacher or mentor. As teachers, the functions would be to address the academic development of students by

faculty, and as mentors to help students go through certain rights of passage. And, at the end of the continuum, the role is sponsor and the function is job placement or career advisement. Because of time, let me just mention some key thoughts I have of each role.

The role of teacher: The purpose of teaching is to engage the minds of students to challenge their intellect, and to enhance their problem-solving ability. By being committed instructors, faculty demonstrate respect and legitimize true acceptance of minorities as scholars.

The role of friend: Because in most programs there are so few minority students, and because they are peripheral to the events in the department, minorities particularly require someone who can identify with the problems they are experiencing. In short, they need companionship, mental relief, stress reduction, and most important, reinforcement and encouragement from significant others which can be provided by faculty who have successfully traversed the rigors and mine fields of graduate school.

The role of mentor: When John Turner asked me to speak, he used a phrase that stimulated my thinking: inner sanctum. In order to reach the inner sanctum, there are rights of passages that one must go through—customs, beliefs, and taboos. Customs are practices or how to do things; beliefs are views, perspectives and philosophies; taboos are what not to do and who not to alienate. The mentor is important in helping students to go through rituals correctly in order to help them and to shorten their stay.

Let me declare that we have not advanced sufficiently to cultivate a mentor approach that works best for a specific minority group. However, besides the changing of faculty attitudes and the four roles I have mentioned, there are some things I have come to conclude should occur if we are to be more successful in nurturing minority students.

Many of our minority students come to graduate school with a low self concept about their ability to be competitive due to years of unconscious bombardment of former teachers of their deficiencies. For this reason a cohort or group approach is important. The critical mass concept helps to form group identity and to reinforce individual identity. Besides admitting cohorts, study groups need to be formalized. This is verified through the experiment conducted at the University of California at Berkeley. Third, socials organized for minority students at the homes of faculty help to break down barriers and bring comfort. Fourth, interest needs to be shown in them as persons and in their culture. Engaging in role reversal allows these students to teach you about themselves. Fifth, verbal expressions to them of confidence in their ability to compete in and to complete their studies will go a long way toward providing the self esteem they need.

In summary, let me say that we must work on faculty attitudes to change the negative attitudes to positive ones. If we can't change views then we must at least somehow neutralize negative views. Second, we must get faculty to involve themselves in the identification and recruitment of

talent. And, administrators must reward this participation. Third, faculty should be aware of and perform the roles of sponsor, teacher, mentor and friend. If we do the foregoing, then we can nurture more and have a better minority person.

Concurrent Sessions

Wednesday, December 2, 1987, 10:45 a.m.

2. SUPPORT SERVICES FOR GRADUATE STUDENTS

Presiding: William H. Macmillan, *Dean of the Graduate School, University of Alabama*
Speakers: Anne N. Medicine, *Assistant Dean, Graduate studies, Stanford University*
Debra W. Stewart, *Interim Vice Provost and Graduate Dean, North Carolina State University*

Anne N. Medicine

No investigation of American Indian education should begin without first noting that American Indians have a unique legal relationship with the federal government. We are guaranteed by treaty certain protections and benefits as a consequence of the forced yielding of some of our sovereignty and land to the United States. Our problems cannot be understood by grouping us with other American minority groups. Our history is simply too different for that approach to work, and many of our concerns have no counterpart in the lives of Black, Hispanic, or other minority groups.

In order to understand American Indian education issues, we must first look at the history of Indian education. Historically, Indian education was the responsibility of the War Department of the federal government. One of the first Indian boarding schools was Carlisle Industrial School (or Carlisle Indian School as it was later called) which opened in Pennsylvania. This school was a converted troop barracks that began receiving Indian students as early as 1885. The mission of this off-reservation boarding school was to assimilate the Indians into the lifestyle of the dominant culture. To accomplish this meant that the native culture had to be destroyed. The boarding schools were purposely located a great distance from tribes' lands or reservations so communication with parents and other tribal people could be kept at a minimum. Indian children were not allowed to speak their native language, wear their native dress, or dance their traditional dances; to do so would be to invite corporal punishment. Many of the children who were forced to attend these distant boarding schools were literally taken from their parents who tried to hide them. Disease was rampant in these schools and children were made to work long hours to survive.

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In 1895, six young Navajos were sent to Carlisle. Only one of these students returned home to the reservation. The rest died of tuberculosis.[1] This attempted forced assimilation was not only immoral and inhuman but it fostered continuing problems and an overall distrust of education by American Indian people. Students returned home to reservations to be neither white nor Indian because the curriculum had not included Indian thought or life style, experiences or values. Students developed feelings of low self esteem, confusion, shame, and alienation because of this attempted assimilation and disregard of their culture.

Every effort was made to make the Indian children feel that their language, culture and, indeed they themselves, were inferior to the non-Indian dominant society.

Students, upon completion of the 8th grade at Carlisle Indian School, were placed on the "outing system" and sent to white homes to become "civilized." My mother was one of those students on the "outing system." She is the only Indian woman I know of who could keep a kosher kitchen and speak five Indian languages.

Hampton Institute in Hampton, Virginia, was another boarding school for Black and American Indian students. Today there is a graveyard at Hampton for Indian children who died trying to return home to their parents and tribes.

These attitudes were well reflected by Captain Richard Henry Pratt, founder of the Carlisle Indian school, when he stated that his duty to the Carlisle student was to "kill the Indian in him, and save the man."[2]

Contemporary Indian boarding schools have made progress from this assimilation model to one of partial Indian control. The progression, however, has been slow and painful. After the War Department came the missionaries who controlled Indian education and sought to Christianize (thus civilize) native people. Then the task of educating the Indian was passed on to the Bureau of Indian Affairs which opened even more boarding schools where the emphasis became vocational training: welding, hair dressing, food service, and agriculture. I myself attended an Indian boarding school where I was taught to be a waitress.

Shortly after the emergence of the boarding school system, Indian education was placed under the jurisdiction of the newly established Bureau of Indian Affairs; once again this system failed to recognize the variety of potential in the hearts and minds of our people. They expected very little of the Indian mind or spirit and so eliminated the opportunity for the development of either.

The B.I.A. continued the use of boarding schools and further emphasized vocational training. It was not until the late fifties that there were changes made in Indian education. These changes were too little and too late. Today we continue to struggle with extremely serious socio-economic problems, the solution to which determine the fate of the Native people of this continent. Clearly, an educated community would have been able to

make a difference in the tribal resolution of many economic development problems.

The educational experience of the contemporary Indian remains dismal, with far too few Native students in the educational pipeline.

The University of Oklahoma reports (Carney, 1978) that the attrition rate for Indian men and women combined is sixty-three percent. The drop-out rate for Indian women alone is an incredible seventy-eight percent. The survey further indicates a significantly lower grade point average for American Indians; thirty-seven percent accumulate a grade point average of less than 2.0 on a 4 point scale. Overall, most Native American students at Oklahoma University do not complete even the first two years of college.

The attrition problem for Native American students is not limited to the University of Oklahoma; colleges and universities throughout the United States with large Indian enrollment experience similar problems. On a nationwide basis it is estimated that the drop-out rate at the undergraduate level ranges as high as forty-six to ninety percent. Many educators feel this is largely a result of the lack of an adequate educational background.

Astin, in 1981, reports that private institutions, probably because of their flexibility, have greater success with the retention of minority students. In addition to the high drop-out rate, Indian graduate students are plagued by delayed rates of completion and the highest rate of interruptions while finishing a degree program of any American ethnic group. The outcome is that fifty three percent of Indian students relocate during their college career. They move back and forth from rural to urban areas. More specifically, a common experience requiring these students to travel back and forth is the expected attendance at family ceremonies.

At Stanford we are experiencing a high retention rate for American Indians and Native Alaskans. In part, the relative success of Stanford is due to strong support services and the high visibility of two Native Assistant Deans who work directly with the students and the local and national Indian communities. We enthusiastically recruit American Indians, Native Alaskans, and Innuits, who are part of Stanford's targeted group of minority students (Black, Mexican American Chicano, Puerto Rican, American Indian, Native Alaskan, and Innuits).

Once admitted to Stanford, a student is welcomed formally and invited to take part in an active Indian community. Indian students have access to an American Indian Cultural Center which has spacious rooms and a kitchen for student potlucks and community gatherings. There are six Indian student organizations on campus. In the fall of 1988, a resident fellow will be available for Indian and non-Indian students who are interested in living togther in an Indian theme house. Our students also organize a Pow Wow (Indian gathering for social and religious dancing) every spring. Last year over 10,000 people attended the Pow Wow, which now has national visibility.

As you may have perceived, the building of social and academic support services is essential for the retention of the Indian student, especially the rural Indian student. Because 60% of American Indians live in urban areas, it is also important to provide support to these students who feel a need to learn from the more traditional Indian student. Speakers from the roster of Indian leaders as well as local Indian people who have issues that concern our students visit our campus. Every effort is made to give emotional and cultural support to our students. We literally build an environment of support for all of our minority students. The development of a supportive Indian community at Stanford has been difficult and could not have been accomplished without the full support of the University.

Last year campus construction work was stopped until a policy could be developed to protect archeological finds (including the human remains of a California Indian). Stanford elected changes in the building site at considerable financial cost.

The use of the "Indian" as a symbol in sporting events was changed to the "Cardinal" by the administration. Faculty and medical students have begun cooperative efforts with the Indian Health Service to assist in their recruitment of physicians. Stanford students are able to do clerkships on several Indian reservations.

The Stanford-Zuni cooperative program is a joint effort between the Pueblo of Zuni in New Mexico and Stanford professors, students, and staff. Last Spring a Stanford professor and Stanford students traveled to the Zuni reservation to teach in Zuni schools. Zuni officials visited Stanford last month to help design a management course that Stanford administrators will teach at Zuni. All of these efforts signal to the national Indian community that Stanford is a caring environment for their students.

The definition of an American Indian is another concern of the University. Minority matching money is available to students who self-identify as American Indian and they should provide evidence of that identity. We view the rich cultural heritage each minority student brings to the Stanford environment as critical and a substantial part of the education of the Stanford student. This definition will apply University-wide to faculty, staff, and students.

Although we are making great strides at our school, the work is far from complete; we continue to need minority faculty as role models and mentors.

Stanford is part of a national consortium recruiting effort called *Full Circle*. This consortium was organized because of the concern over the lack of American Indians in higher education. The founding schools are: Harvard, Yale, Princeton, Brown, Dartmouth, UCLA, Cornell, Stanford, and the University of Massachusetts at Amherst. In total, 17 universities participate. Students who call the following number will be put in touch with the Full Circle schools. The number is 1-800-Circle 8 or 1-800-247-2538 (national including Alaska).

The internal torments and the external liabilities I mentioned are challenges which we intend to meet in the coming generation. Although we have been the most underrepresented community in American higher education—being only half as likely as the next most underrepresented group, Chicanos, to attend college—we have not given up on ourselves or on carving out a significant new place in American society. We are making contributions to our community, as well as to the country at large, and we enjoy a growing self-esteem as we see our impact felt and see the difference we can make in a world entering the twenty-first century.

I invite each of you to participate in this critical endeavor.

Notes

(1) Ruth M. Underhill. The *Navajos* (Norman: University of Oklahoma Press, pp. 207-208).

(2) Richard H. Pratt "The Advantages of Mingling Indians with Whites, in *Americanizing the American Indian: Writing by the Friends of the Indian, 1880-1900.* Edited by Frances Paul Prucha (Lincoln: University of Nebraska, 1978, p. 261).

Graduate Student Support Services: An Underlying Philosophy

Debra W. Stewart

Graduate Student Support Services is a somewhat uncomfortable topic for graduate deans to address. The discomfort is assuaged a bit if we specialize the notion to target particular groups: support services for minority students; support services for returning older students. But even there it too often takes on the connotation of a temporary program: designed to ease a transitional discomfort; and often scheduled to "wither away" in the near future.

The concept of ongoing responsibility for graduate student support services is alien to most graduate schools and graduate deans. If we worry about it at all we worry about it last: after graduate faculty selection, after program evaluation and review, after grievance procedure, after curriculum development, after much procrastination we worry about providing services in support of graduate study.

This is the one task that graduate deans tend to shirk. It reminds me of the way Paul Samuelson once described how he felt about washing forks: "I always wash the forks last in the realization that should an atomic holocaust be imminent there may never be a need to do them." In that sense

fork washing and Graduate Student Support Services have a lot in common. The thrust of my remarks today will be to explore why.

My theory is that, for the most part, we postpone action on the provision of student support services because we lack a clear philosophical basis for action. We have no shared and clearly articulated definition of "support services" at the graduate level. It is a functional responsibility that has historically resided in student affair offices with a focus on the *undergraduate* rather than graduate experience. I would like to take a few minutes to suggest a philosophical base and to indicate the infrastructure for support services that flows from that base.

Graduate Student Support Services should be discussed against a background of understanding the distinction between the graduate and the undergraduate experience.

Graduate education is the final stage in the development of intellectual independence. It is different from the undergraduate experience in several important aspects. While the undergraduate acquires information, develops background, and builds perspective, the graduate student breaks new ground. He/she establishes the premise, develops the hypothesis, and builds the theory. The whole purpose of education at the graduate level is to create the environment and incentive for the graduate student to engage in independent inquiry. The professor here becomes a supportive critic, sometimes a harsh critic, of the student's work. The agent of learning is the student, not the professor.

This view of the graduate student experience calls for programs/strategies that support the "independent scholar" end. Specifically, graduate schools are called on to support two aspects of the students' development: to support students in development as scholars; and to support the students' development as citizens of a community.

Support of scholarship can come in a variety of forms. At North Carolina State University (NCSU) two forms of support for graduate student scholarship currently in place are (1) a workshop in thesis preparation and publications and (2) colloquium on ethical dimensions of scholarship. The purpose of the thesis workshop, run by our thesis editor, is to instruct students on the fine points of thesis preparation and to provide technical support to enhance prospects for publication. The monthly colloquium on "Ethics and Graduate Education," initiated by the Graduate School, in cooperation with the Graduate Student Association (GSA), provides an opportunity for student-faculty dialogue on the ethical dimensions of scholarship and professorial practice.

Support of the graduate student citizenship in the university community is a second significant area of responsibility for graduate deans. This is expressed in different forms from campus to campus with the principal opportunity for citizenship through graduate student associations. On our campus we retain a position on our Administrative Board of the Graduate School for the Chair of the Graduate Student Association. Graduate

students regularly serve on Administrative Board Committees. Membership on this most prestigious and powerful policy board provides graduate student leadership a meaningful voice in a wide range of issues that impact the lives of graduate students To ensure that the graduate student voice is heard and understood in the daily operations, the Associate Dean of the Graduate School meets every two weeks with the GSA leadership. This ensures ongoing dialogue on issues of mutual concern.

Finally, we take all opportunities available to support the GSA. On our campus the GSA has a small office and a modest budget. We are currently working to identify more adequate and accessible space for the organization. Under this category of "supporting graduate student citizenship" I describe activities in which all graduate schools engage to some degree. I mention these things, however, because I believe that strengthening the student organization is one of the most effective strategies for ensuring that appropriate and necessary support services are identified and established.

The objective at NCSU is to create an infrastructure that enables graduate students to articulate their own demands for the kinds of support essential to their growth as scholars. On our campus this structure has enabled graduate students (as citizens of the university community) to press demands for:

1. An increase in our emergency loan fund.
2. Improvements in our Teaching Assistantship preparation program.
3. Alteration in the Teaching Assistantship payment schedule from 8 to 10 months.

Each of these demands is political in nature because each deals with the possible reallocation of resources.

Some graduate deans, when confronted with such demands would argue that the leadership of their graduate student associations are plagued by what Chopin once called the "Englishman's disease": they play the good notes with indifference and the bad notes with great passion. I invite you this morning to join me in seeing that, as political agents, the GSAs need to play the bad notes with passion: these graduate student leaders are playing out constituency roles in the university political system. Our goal as graduate deans should be to strengthen the quality of citizenship opportunities for graduate students. This means recognizing the legitimacy of constituency roles.

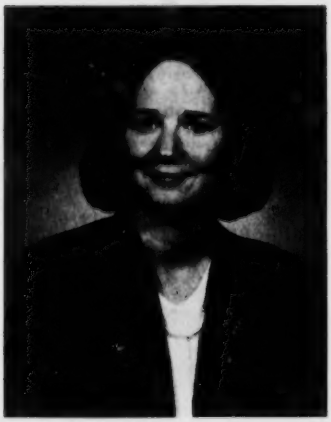
Graduate students are different from undergraduate students. This is not to say that graduate students have no need for support services. It does mean that they have a need for support services that are keyed to their growth as independent scholars and professionals. This is the philosophical underpinning that should support our efforts to identify the right services for graduate students.

SOME CONCURRENT SESSION SPEAKERS

Anne N. Medicine
Assistant Dean, Graduate Studies
Stanford University

Robert Gordon
Vice President for Advanced Studies
University of Notre Dame

Arthur C. Frantzreb
Consultant in Philanthropy
Arthur C. Frantzreb, Inc.



Debra W. Stewart
Interim Vice Provost and Graduate Dean
North Carolina State University

3. FUND RAISING AND GRADUATE DEANS

Presiding: Russell G. Hamilton, *Dean for Graduate Studies and Research, Vanderbilt University*
Speakers: Robert E. Gordon, *Vice President for Advanced Studies, University of Notre Dame*
Arthur C. Frantzreb, *Consultant in Philanthropy, Arthur C. Frantzreb, Inc.*

A Graduate Dean Looks at Fund Raising

Robert E. Gordon

Most deans who also bear some responsibility for research and sponsored programs have been heard to say, "the institution is unable to support all your needs as a scholar; you'll have to write a proposal to an outside patron . . ." and thus it has been since the first Ri's of Ireland kept a scholar or two, if not a court jester, around the palace. (At Notre Dame, everything is measured in terms of the sainted people—the Irish.)

No institution today, public or private, is able to support active programs of scholarship, teaching, research, and service based solely on a cash flow from taxes, or from endowment and student tuition and fees. institutional fund raising is an absolute necessity.

Let me pause a moment to establish what I mean by the term *institutional fund raising.*

Securing outside funds for the institution embraces a continuum of activity between two distinctive points. One could call it *The Continuum of Resource Development.* On the one hand, the activities are centered in the Office of Research and Sponsored Programs. Here the activity is usually based on well developed proposals that may lead to awards of either a grant or a contract. The work supported usually responds to an individual or small group priority. The proposals are directed mainly toward governmental sources, and less intensively, but increasingly these days, toward foundations and corporations. The proposal activity emanating from the faculty always envisions commitment of some existing resources.

At the other end of the Resource Development Continuum are the activities that we discuss today. They may be carried out by an office—the Institutional Development Office or a semi-autonomous foundation organized to receive gifts or contributions from alumni/alumnae and friends of the institution. The activity may include proposals, but the funding sought is normally for institutional priorities as opposed to individual faculty projects. The appeals or proposals are generally directed toward private sector sources: individuals, foundations, corporations. The

resource developers almost always envision an addition to existing resources and often are puzzled if one points out that some prospective activity involves specific commitment of existing resources, i.e. faculty time and effort; commitment of maintenance funds to sustain new facilities, etc. (The phrase, "One can gift himself poor," comes to mind.)

So what we talk about today is institutional fund raising or resource development, not research and sponsored program activity, although the two seem more and more to blend toward, if not into, each other.

I use the words *institutional fund raising* to underscore the fact that the activity is and must be a total institutional effort—not that of each individual college, each individual school or each research institute. It is an activity organized by professionals and best conducted by an admixture of resource development professionals, plus those who will either lead, or benefit by, the specific activity for which support is sought.

The specific organization of fund raising varies from institution to institution and seems highly dependent on the nature and structure of the place.

To participate successfully in this activity, a graduate dean needs to learn first how fund raising is organized in his or her institution and what ground rules are applicable.

At Notre Dame, fund raising is centralized but heavily dependent on those who will ultimately use the fruits of the effort in their work. This is simply a corollary of the old adage, don't separate the planning from the execution. It wasn't always that way. Historically, fund raisers thought only in terms of brick and mortar. It is only in the last twenty years or so that investment in people has come to be a keynote. If you invest in people, you invest in their activity and that opens large doors on what goes on inside the brick and mortar structure. Whereas in earlier years the activity might have been confined to the President's office, today's emphasis on people and what they do involves others throughout the institution. The Graduate Dean has an important role in explaining to potential patrons (and the institutional fund raisers) the relation of scholarship and research to teaching. I give a seminar to our fund raisers on this subject about once every two years.

Centralization of fund raising means essentially that someone controls the flow of proposals out of the institution. There is, in effect, a traffic controller who operates the green, yellow and red lights on each foundation, corporation, individual that has been identified as a potential patron of the institution. It is a grevious "No-No," deeply imbedded in the memory of man, for someone in administration or on the faculty of Notre Dame to approach a potential patron without first clearing it with the Office of University Relations, our development group. That basic ground rule is passed on to the new member of the community with the faculty ID card.

Controlling fund raising efforts from a central point prevents duplication of effort, insures that the institution establishes its own priorities and

has only one proposal before each patron at any one time. This keeps foundation and corporation personnel very happy. They really dislike calling to find out which of two proposals the University really wants.

That leads us to the matter of priorities: who determines them and what are they? In my university there is a major review involving the entire university once every decade. The results of this review are published. In the 1970s the review was called the COUP REPORT (Committee on University Priorities); in the 1980s a similar activity led to PACE (Priorities and Commitments for Excellence). In both reports, graduate studies and research are conspicuous elements. Also in both reports, the priorities for the total institution are spelled out. Further the vision of each element is clear and stated in simple language.

The translation of those priorities into units of activity that may be funded or marketed is a very important part of the major fund raising campaigns that followed each of the priority reports. We are currently in such a campaign with a goal of $300 M. Of some 35 line items comprising the total activity, 14 are directly related to graduate education and research. Each is stated clearly in simple language. These 14 items will be funded at $75.5 M or 25 percent of the total goal. All of this fund raising activity came about by first establishing a series of priorities for the Graduate School and research. In that process, senior faculty, the Graduate Council, the University Committee on Research and Sponsored Programs and other ad hoc groups and task forces had an input. It was my job as graduate dean to orchestrate that input.

The existence of an institutional approach to fund raising facilitates my work. Once having established priorities for graduate study, scholarship and research, it remained only to plug them into the institutional effort. As that effort proceeds, I am constantly seeking ways to translate the priorities into units of activity that may be more easily funded or marketed by our fund raisers. A key to this is to be firm with respect to the major priority, but flexible as to the mechanism by which you reach your goal.

One major priority has to do with faculty development with respect to competitive grant proposals and outside funding. The specific goal is to provide each new faculty member, or an older one who wants to change areas of research, with seed money on a competitive basis in which the final report takes the form of an application to a potential patron. I have been quite successful in leveraging such seed funds over the past 15 years to a point at which we are currently obtaining $13 in awards for each seed dollar expended. Hence we wanted endowment funding for this activity. It could be totally centralized in my office, or it may occur through specific institutes created for the purpose in each of the colleges.

I reasoned that the more points of contact that I had spreading the germs of proposal writing and submission throughout the University, the better off we would be to achieve our goals of greater and more effective participation in scholarship and competitive research funding. Thus I welcomed

the thought that we should break down a multimillion dollar endowment package into smaller units spread through the University. This was done and has been very effective. We continue to operate a central program, but there are additional discipline-specific institutes promoting sponsored program activity in several of the colleges.

Not all fund raising involves orchestrated campaigns. Much of it involves an element of opportunism: matching a donor's interest with an institutional priority. Each of our regionally based fund raisers needs what I call a "full bag of tricks"—a series of marketable ideas that may be presented to a prospective patron as his, his or their interests unfold. Certainly a major role of a graduate dean is to identify the needs of students and faculty in carrying out graduate programs and then translate those needs into saleable packages, elements of the "bag of tricks," whose funding will help move scholarship, graduate study and research forward in the institution.

Two other matters need mentioning. The importance to the donor of a well developed annual report cannot be overemphasized. I just obtained a second grant of $1,000,000 from a foundation to support a competitive program of seed grants, research travel and an information center, based almost totally on the quality of the annual report sent in on the achievements with the first one million. We never fail to inform a donor about the individual who currently occupies the named fellowship established by that donor, and the number of such fellows that have been supported to date.

Finally, the last significant fund that I had a direct hand in raising—an endowed fellowship—came this fall solely because the donor heard me in a very informal setting wax a bit eloquent and enthusiastically about the importance of investing in young people. I didn't know that this man would sell his business and be in a position to put up hundreds of thousands to endow a fellowship, but I did know that fellowships were vital to the formation of a scholar, and I didn't mind saying so in non-academic company.

To sum up my remarks, fund raising is best performed as a team effort. Your initial contribution as a graduate dean is to establish priorities for your school and integrate them as institutional goals.

A second level of activity involves translation of those priorities into functional, saleable units.

A third important function is to demonstrate the relationship of what you do in scholarship and research—so little understood by the general public—to teaching, a thing they seem to know about.

Lastly, once funded you have a responsibility to report the importance and the impact of the activity on the institution to the donor, with emphasis on scholarly achievement and people.

Philanthropy and Graduate Deans

Arthur C. Frantzreb

Our nation's graduate schools represent the penultimate meaning of the Greek roots of the word philanthropy, *philos-anthropos*, "love for humankind." Each nonprofit institution, each graduate school is a philanthropy, not just a mere academic entity. Each exists to benefit humankind whether through education, law, agriculture, medicine, religion, engineering, or other professional career prepared to help people. The admonitions to be philanthropic and the benefits thereof permeate our basic religious teachings as well.

People can be philanthropic whether through time, talent, treasure or all three. Our government encourages philanthropic generosity through tax benefits, which, when such generosity is recorded, saves our citizens great involuntary taxes. For instance, if we did not have tax deductible benefits, the $87.22 billion given voluntarily in 1986 would require at least $2.3 trillion in additional taxes to go through the federal bureaucracy to get the voluntary amount back to recipient institutions—thus, the power resident in our system of voluntary values.

The traditions of voluntary philanthropic productivity in our society have been greatly enhanced in both sophistication and results within my experience which began in 1948. At that time, I was a member of the staff of Marts and Lundy. The firm conducted a study to ascertain whether $10 million could be raised. The results revealed that an incalculable amount could be raised. The $90.25 million, ten-year Greater Cornell Fund program resulted. There was no long range plan, no strategic plan, no positioning, no marketing, no feasibility study. Dr. Edmund Ezra Day asked his faculty what they needed to teach with over the next ten years. The results: $90,250,000. The program started and was completed in eight years, not ten. That was the first really large philanthropic program in the history of our country. Today such programs are standard operating procedure. What has happened?

First, planning for current and long-term fiscal stability and security can be based upon demographic data, fed into strategic planning, and result in a comprehensive resource development program. That program involves generous, continuing and increasing voluntary support for current, special project, and endowment funds. Today, the amount of philanthropic funds being sought is a public declaration by the institution of its value to society. So it was at Cornell. The psychology of feasibility is changed from estimates of probability to declarations for sustaining values.

Second, recognition exists that philanthropic productivity is no longer a system of mere dull mechanical processes. Today, 90-95% of asset-building program results come from one to two percent of carefully studied and

oriented constituents. Also, we know that such constituents perceive their commitments in terms of their part in helping to achieve announced goals.

Third, the sophistication of resource development personnel has graduated from perceptions as mere administrative clerks to major executives of demonstrable, creative, executive leadership talents and skills.

Fourth, the positioning and marketing of philanthropic investment gift opportunities have expanded from isolation in one administrative office to "branch offices" throughout a single campus, and in areas of in-state and out-of-state concentration of constituencies.

Fifth, recognition exists that far greater numbers of 6-, 7-, and 8-figure gifts are being committed based upon new levels of institutional missions, goals, and objectives Also, the psychology, philosophy, and spirit of motivation and inspiration, basic to voluntary giving, have replaced suspicions of greed, fear, tax evasion, etc.

These basic factors are vital to graduate dean perceptions of their role in philanthropic productivity from their constituents. Simply asking for a buck is an insult to sophisticated constituents. If you are a Mercedes or Rolls-Royce entity, assess your qualities and "sell" excellence of performance, qualities of pride, and personal rewards in participatory investments in quality achievements based upon demonstrated confidence and potential.

First as a counsellor then as first development officer of Rutgers University, 1950-1958, I saw the creation of the Graduate School of Business under Dean George Esterly thrive by designed interrelationships with Newark, New Jersey business firms. I designed and conducted the program which resulted in a new law facility demanded by New Jersey Chief Justice Arthur T. Vanderbilt and administered by State Senator and Dean Alfred C. Clapp. And, I worked closely with other graduate and undergraduate deans at Rutgers.

Throughout my experience, I have seen countless examples of graduate school alumni who both resist and resent requests even for basic operational support of their professional school. Yet, it is this school's very existence and the personal training that these alumni have received which accounts for their productive livelihood. Herein lies a great challenge for deans to begin philanthropic productivity at home.

Economic reality and fiscal stability have dictated new dimensions of leadership to insure professed values of excellence in scholars, scholarship, research, equipment, facilities or endowment. Independence from the human and administrative requirements for philanthropic productivity dean-by-dean, school-by-school has resulted today in dependent independence.

A new level of mutual dependence among all top executives is required forming a new, yet old, concept of teamwork.

At the graduate level of higher education, deans and their faculties must understand, appreciate, and advocate the diverse sources of revenue

required to underwrite and undergird their mission. Then, their students—as responsible professionals-to-be—must understand the costs and financial resources required for their training. Their students are first alumni-in-residence, and then, alumni forever and responsible forever to assure the same opportunities for professional status as others have provided for them.

Internal orientation about the conditions precedent to generous philanthropy must be a persistent effort to understand the motivations for voluntarily giving of resources whether those motivations be psychological, philosophical, spiritual, cause-related, or just simply, gratitude for benefits received and enjoyed.

This prerequisite for internal orientation has been most dramatically demonstrated by what has happened at the Duke University Medical School. Here the dean reportedly went to the University Development Office requesting information on ways and means to increase the School's endowment for long-term fiscal stability and security. The record of fiscal generosity of medically trained constituents stands as a national tragedy. Yet something happened at the Duke University Medical School.

There was created a Chancellor Series of gift level donor investors of minimum $100,000 amounts through life insurance on the investors. Faculty members aged 33 to 47 were first constituents to be invited to subscribe to the new program. Some $10,000,000 were reported in endowment expectancies resulting from minimal 5-year, tax deductible premiums. These faculty members became voluntary philanthropists. They have set a pattern. The entire internal Medical School constituency had to become first investors to insure the values of their professional teachings. The goal of the Chancellor Series is $100,000,000 in endowment.

Graduate deans and their staff members must expect the following administrative requirements to be in place and functional if,—if they desire private sector philanthropic generosity:

1. Coordinate and cooperate with the central resource development office, as party to the whole institution in all relations, communications, philanthropic programming, volunteer organization, prospect research, record keeping, acknowledgement, recognition, and gift and grant accountability policies and procedures.
2. Prepare a prospectus outlining future goals and objectives in a motivational "sales" tone and format.
3. Prepare an untotalled list of current and endowment investment gift opportunities beginning with endowing out of the budget as many features as possible based upon those costs five to ten years from now.
4. Research present constituents to ascertain the top one to ten percent who appear to be candidates for further research to ascertain personal and professional nuances vital to cultivational results and assessment of philanthropic potential.

5. Conduct selective market testing of both #3 and #4 in a "sales," not a feasibility, mode.
6. If truly substantial investment and grant results are desired, the 10 percent constituent figure must be reduced to one to two percent for concentration on the largest prospects first.
7. Begin a series of bimonthly communications from the "Desk of the Dean" about personal, personnel, programs, demographic, and other features in short form sent to the top two to ten percent of the constituents.
8. Consider options for a volunteer structure based upon the fewest persons needed and of highest "power" authentication, not large numbers.
9. Consider strategic options for implementing programs consistent with overall institutional time schedules, functions, and leadership.

Scholars and scholarship are priceless intangible commodities in our society. Graduate deanships are models of that scholarship. Those who are attuned to the motivation of their constituents at the same time they are administering their faculty, students, services, and future will be inculcating conditions precedent to generous philanthropic productivity.

The amount of philanthropy resident in individuals and families alone is incalculably large. It just simply has not yet been requested based upon the intangible motivations of wanting to make a difference even anonymously. The opportunity is yours. The results require only intense sensitivity to human relations values of philanthropy based upon evidences of confidence of leadership, designs for your destiny, and productivity of diverse financial investments.

Plenary Session II

Wednesday, December 2, 1987, 2:00 p.m.

ISSUES IN GRADUATE EDUCATION IN THE PHYSICAL SCIENCES

Presiding: Lee B. Jones, *Dean of Graduate College and Executive Vice President/ Provost, University of Nebraska*
Speaker: Homer A. Neal, *Chairman, Department of Physics, University of Michigan*

Selected Issues Facing U.S. Graduate Education

Homer A. Neal

Introduction

I have chosen to address three specific topics during my presentation today. None are new to the audience, and I can only hope to provide a perspective that may be different from others you have heard.

The issues have to do with the troubling trends in the U.S. scientific human resource picture, the efforts being made at the National Science Foundation to revitalize our research and development activities, and the planning our universities must undertake to accommodate new large-scale facilities such as the SSC in the decade ahead. On the surface, these items may appear to be totally disjoint. I assert, however, that they are connected by a simple theme. Namely, what is the U.S. going to do to make sure that it is more technogically competitive and more daring in identifying ways to produce, nurture and encourage high quality research, and what is the state of the talent pool that must produce the scientists, mathematicians and engineers to do this research.

Human Resources

For a country to excel on a sustained basis in the scientific arena, it must have a continuously replenished pool of motivated scientists, engineers, and mathematicians, a sound industrial and governmental funding base, and a society that values the contributions of science to the well-being of its people. One can write several treatises on each of these topics, but in this section I want to focus on the "replenishment" issue, which happens to be one of particular relevance to the graduate deans assembled here today.

The term economic competitiveness has surfaced prominently in many quarters during the FY1988 budget discussions. In the abstract, it is not

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clear what one means by the use of this phrase. But in the concrete, one has only to note the impact of the loss of the race to develop a particular microchip to see what the implications are, as tens of thousands of individuals lost jobs in California as a result. Just a couple of years ago our country had a trade surplus in high-technology markets of over $4 billion. But in 1986 we had our first absolute trade deficit in the high-technology area, something that would have been unimaginable a few years ago. This should be a source of great concern.

In a report prepared for the National Science Board in 1985 we pointed out that "The most striking and pervasive change in the 1980s—one that is fundamental and irreversible—is the shift to a global economy. The only way we can continue to stay ahead of other countries is to keep new ideas flowing through research; to have the best technically trained, most inventive and adaptable workforce of any nation; and to have a citizenry able to make intelligent judgements about technically-based issues . . ." It is in this context that I believe there is reason for concern about the declining enrollments in graduate education at precisely the time when we see that the future will require an increased fraction of our population to have advanced training.

It would be helpful to examine what we know about the higher education section of the so called "educational pipeline":

- overall, the number of undergraduates opting to pursue studies in science is declining. [In the period 1973-1983, the number of undergraduate science majors declined by about 15%.]
- overall, graduate enrollments are declining. [In 1978, the number of Ph.D.s awarded was 32,664; in 1985 the number was 31,253.]
- the number of 18-year olds is expected to be significantly below the present value for most of the remainder of this century.
- the fraction of the brightest entering freshmen indicating a desire to major in the physical sciences has steadily dropped by a factor of three between 1967 and 1983.
- of the 12.3% growth expected in the U.S. population between now and the end of the century, over 60% of this amount will be made up by blacks and Hispanics. By the year 2000, the U.S. population is expected to be one-third minority. If the number of minorities interested in careers in science and engineering is not increased significantly, there will likely be a serious shortfall in meeting national needs in many areas.
- in spite of the serious underrepresentation of minorities in graduate school (receiving less than 5.5% of the doctorates in 1984), there is evidence that the number is in a state of general decline. For example, the black enrollment in graduate schools has declined more than 19% in the past decade.

These observations do not paint a very rosy picture for the future. Active intervention would seem to be justified, and one of the prime participators in such a process should be our universities.

Concerning the question of what the graduate schools of the country might do to help in dealing with the minority enrollment issue, I would like to report on some of the action items discussed in a recent conference on the production of minority scholars held at the State University of New York at Stony Brook. This conference was supported by the National Science Foundation and the Carnegie Corporation and, I am pleased to note, had the strong and active participation of several CGS officers.

- to enhance the number of minority students remaining through degree completion, every graduate school should investigate the implementation of a mentoring program for its minority graduate students, providing appropriate recognition of the special efforts of faculty members who make extraordinary commitments in this area.
- every university should examine the possibility of implementing a program whereby its own outstanding undergraduates are identified early on and encouraged to consider a graduate program at that institution. [This does indeed violate the old maxim that students should go elsewhere for their graduate training; however, there is evidence that many good students stay right where they are and do quite well, and that most of these students are not minority students—the very students who might benefit most from not undergoing the traumatic resettlement experience. Moreover, the very act of establishing a supportive contact with a budding scholar helps to reinforce that person's self-confidence, and to inform him or her of what graduate school is all about, even if in the end the student goes to some other fine school.]

There are many other strategies that should be implemented, for the good of all students, minority and non-minority. I respectfully claim that our nation's graduate schools are not doing as good a job as they should in conveying the message to prospective students why they should consider a graduate career. In the absence of good information to the contrary, many students will simply do their own analysis, taking into account only those parameters they can readily identify. For most the predominant considerations are financial costs and the additional term of servitude as a student. These are weighed against the possibility of immediate financial freedom and independence from "studenthood", something that many will have yearned for over sixteen years. If we do not capture their attention during their undergraduate years and tell them that though they have come a long way, but they have a little farther to go to achieve a level of preparation that will uniquely qualify them for a leadership position in their discipline, then we will be doing nothing to counter the natural forces pressing them to exit the educational pipeline at the next bus stop. By no means am I suggesting that graduate school is for everyone. But we are losing just too many talented students, and something should be done to reverse this trend. Graduate deans have a real responsibility here, and I hope that in the years ahead you will take actions to rise to the challenge before you.

National Science Foundation Initiatives

As many of you are aware, for a period of many years I have been associated with various activities of the National Science Foundation. For the period 1980-1986 I served as a member of the National Science Board. I am presently the Chairman of the National Science Foundation's Physics Advisory Panel. My remarks here today, however, are not made in any of these capacities. They originate from the perspective of an individual who greatly values the role the NSF has played in the development of U.S. science, mathematics, and engineering, who endorses the initiatives being taken by the NSF to expand its base of federal support, and who is also pondering the implications of the proposed changes in the modalities of federal research support. My reason for including this as one of the issues in my presentation today is that I regard the full attainment of the doubling of the NSF Budget over the next five years as being extraordinarily important, but unlikely to happen unless there is strong and continued community support and pressure at all levels. That support can be insured only if there is a general understanding of the options and issues involved.

The NSF Director and Science Board are to be commended for achieving an agreement with OMB for a program that would lead to the doubling of the NSF budget over the next five years. Even then, the NSF budget will be demonstrably smaller than it should be, given the mandate that the agency has for insuring the health of basic research and science education in the U.S. The commitment for a doubled budget was predicated, however, on the introduction of centers for science and technology designed to improve our national competitiveness.

The reaction of several sectors of the academic community to the center concept has been reserved. They would be most willing to take the new money, but are concerned about the implied change n the modalities for conducting research, even if the centers are never to become a major part of the overall NSF program. The fears in this area are heightened by the concern that the NSF may wish to proceed to develop these centers even if the Congressional budget process does not produce the incremental support requested by the President for the NSF. The implication is that the existing base program, i.e., the traditional investigator support program, would bear the brunt of funding these new initiatives. Almost nothing could do more to sharpen the question of "what is the best way to support U.S. research?" Should we have more centralized facilities, with a reduction of the fraction of our support going to individual investigators? Should we direct more of our funds to scientists with extraordinary promise (e.g., Presidential Young Investigators), or do we get more results per dollar by continuing to provide broad base support, with the expectation that startling results might arise almost anywhere in our vast sea of high quality, ongoing research?

These are some of the issues, and in the long run the collective wisdom of

the country must be brought to bear on the solution. The graduate deans of our U.S. institutions must certainly have something to say on this topic, and should do so. The current thrust on the part of the NSF is one, I would claim, that should be pursued. There are a couple of provisos I would insert (and I have no reason to believe that these are inconsistent with the views of the NSF administration). One is that the current program be viewed as experimental, with data being collected to aid in the development of longer range plans. Second, I urge that the funds for this experiment (and for a selected small number of other initiatives) be taken from the growth funds in the NSF program, and that the "golden goose"—the single investigator programs—be kept at essential parity during these tests. The transistor, laser, NMR imaging, non-linear optics are all examples of even technological strides developed in the settings of traditional university based projects, and we must be careful not to tamper with such a successful strategy. But, as Roland Schmidt, Chair of the National Science Board, pointed out in a recent discussion with me, "how do we know that under a different modality we would have not done better?" That is a fair question, and it is appropriate that a national body such as the NSB precipitate the necessary experiments to extract an answer to this question. To help maintain a reasonable degree of coherence of the university-based scientific community during the testing of innovative options, the help of groups such as CGS could be most useful.

In addition, I especially urge you to support through your congressmen and others the need for a rapid ramping of the NSF budget. Without these new funds, we risk being locked into the current stagnant situation, with almost no opportunity for exploring new avenues. To give you an idea of just where things stand, I want to review some of the gross figures for Physics in the NSF. This example is given only as an example; I am sure that other units within the NSF are suffering similarly.

Comparing the FY1987 NSF Physics budget with the FY1988 budget submitted to Congress, one observes that the Physics Division is scheduled to receive a 12.1% increase (assuming that the full Presidential request is granted—not a good bet at this stage). Of this 12.1% growth, 2.7% is targeted for science and technology centers, 2.2% for other targeted initiatives such as the PYI program, the Undergraduate Science and Engineering Program, and so on. Another 4.9% is required to fund planned construction projects. This would leave, in the best of circumstances (with the NSF getting the full requested amount in this first year of its doubling scenario) a sum of 2.3% for the normal university based program, an amount less than inflation. Moreover, this corresponding figure is 0.6% for last year, and −3.6% for the previous year. In sum, the university base program will have regressed some 15-30% over the past three years (depending on the inflationary factor used). Let me hasten to add that the university program has certainly benefitted from certain of the targeted programs over the years, and it would be most inappropriate to totally discount the impact of

these programs in making a budget analysis. The point is, however, that by far the majority of the nation's scientists will not see the impact of these special programs, but will see that their grants support significantly less research now than they did three years ago. This example highlights the distribution issue that will need to be resolved in the coming years, and highlights the need for increased NSF funds.

Large Scale Facilities

As you are aware, we in high energy physics are looking forward with great expectation to the funding, construction and utilization of a very large particle accelerator called the SSC (Superconducting Super Collider). The device would have a circumference of 52 miles, cost approximately 6 billion dollars, and would require roughly a decade for construction. It would permit the exploration of matter at distances considerably less than $10^{**}(-18)$ meters. On this distance scale, we could study quarks themselves (quarks, being the constituents of protons, neutrons, etc.), and study many phenomena important to understanding the ultimate structure of matter. In January, the National Research Council will announce the next cut in the pending site proposals, and current plans call for the President to announce the final site in January, 1989.

As an individual who played a role in the early design of our present largest accelerator at Fermilab, and who has served on the Board for that and other laboratories, I want to share some thoughts regarding some of the problems both the physics community and universities must prepare themselves to face in the years between now and the commissioning of this new facility. You may be wondering just what this project could possibly have to do with the Council of Graduate Schools: let me try to explain.

It will be your students and faculty who will be scrambling to conduct their frontier research on this spectacularly unique facility. It will be your young faculty who will join your departments in the next few years with the desire to start a 7-year research and construction odyssey for an experiment at the SSC, even though they will have little to show in the way of original physics publications when it comes time for them to be reviewed for tenure. It will be your graduate students who will want to work on construction and design SSC projects, though there will be no chance for them to complete original thesis work in the traditional sense.

The problem is certainly one that graduate deans should be concerned about. You have the responsibility for seeing that the tenets of quality are preserved in your universities, but you also have the responsibility for seeing that flexible arrangements are made to accommodate truly radical changes in the ways that frontier research is conducted.

I have no solution to offer today, and I seek only to alert you to the fact that the problem is going to surface. Moreover, the problem will not be confined just to high energy physics. The new science and technology cen-

ters, large scale projects in biosequencing, centralized facilities in nuclear physics and condensed matter physics, all point to similar issues in a broad range of the sciences in the years ahead.

The Department of Energy has formed a sub-panel of HEPAP (High Energy Physics Advisory Panel) to look into this general issue from the perspective of high energy physics. I am a member of the subpanel, and would welcome any direct information you would like to share. Our report is due next spring, and I am sure it will receive widespread distribution, and it will likely call upon your universities to consider interim measures to facilitate the participation of graduate students and young faculty in the SSC project.

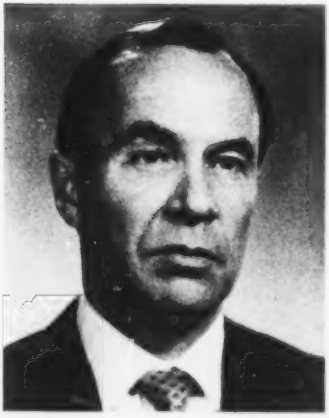
Closing Remarks

There are challenging times ahead. Opportunities for failure and spectacular advance abound on almost every front. Universities working in concert with the federal agencies and the private sector can help sustain the course of our country as an innovative and productive nation. The role of graduate deans in guiding their universities through the labyrinth of options and emphases is a critical one, and I urge you to exercise your influence and to enlist the services of your universities in preparing the nation for the 21st century.

MORE CONCURRENT SESSION SPEAKERS

Meng Yang
Graduate Student, Cornell University
and former Second Secretary, Office of
Education, Embassy of the People's
Republic of China

Edmund T. Cranch
Granite State Distinguished Professor,
University System of New Hampshire



B. Bingham Cady
Professor of Nuclear Science and
Engineering
Cornell University

Li Mingde
First Secretary for Science and
Technology
Embassy of the People's Republic of China

Concurrent Sessions

Thursday, December 8, 1987, 10:45 a.m.

4. CHINA AND AMERICAN GRADUATE SCHOOLS

Presiding: Alison Casarett, *Dean of the Graduate School, Cornell University*

Speakers: Li Mingde, *First Secretary for Science and Technology, Embassy of the People's Republic of China*

Meng Yang, *Graduate Student, Cornell University, and former Second Secretary, Office of Education, Embassy of the People's Republic of China*

Halsey L. Beemer, Jr., *Executive Director, International Advisory Panel, Chinese Development Project II, National Academy of Sciences*

DEVELOPMENT OF SCIENCE AND TECHNOLOGY IN CHINA

Li Mingde

China, which in the past has made many significant scientific and technological contributions to the world finds itself in the position of developing its science and technology. In 1976 China entered a new period in which the central task is to modernize agriculture, industry, national defense, and science and technology. The modernization of science and technology is key to the realization of modernization in the other three fields. Based upon the experience gained in the past 30 years, in 1980 the Chinese government formulated a new policy in order to guide the progress of science and technology in its country. The focus of this policy is that economic growth must rely on science and technology which in return must serve economic construction. Chinese scientific and technical workers are now doing their utmost to implement this general policy.

I. R&D System in China

For more than 38 years China has had a R&D system of five component parts with 4,690 R&D independent institutions and 576,000 S&T personnel of whom 231,000 are scientists and engineers. Total R&D expenditures directly appropriated by the government in FY 1986 were eleven billion Chinese yuan.

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The first part of the system is the Chinese Academy of Sciences (CAS) with 122 research institutes and 58,220 S&T personnel accounting for about 10 percent of the S&T manpower in the country. Its efforts are focused on research in basic sciences, newly emerging scientific areas, and high technology.

The second part is the research institutions that function under various mission agencies of the State Council. There are 622 research institutions under the mission agencies with 204,370 S&T personnel accounting for about 35 percent of the total S&T manpower. There are some outstanding research centers and academies in the mission agencies such as the Chinese Academy of Agricultural Sciences, the Chinese Academy of Forestry Sciences, the Chinese Academy of Medical Sciences, the Institute of Traditional Chinese Medicine, the Chinese Academy of Geological Sciences and so on. The research institutions under the mission agencies engage mainly in applied research and development that is closely related to the needs of various government agencies.

The third part is the research organizations that operate under the universities and colleges. In recent years many universities and colleges in China have established research institutes or laboratories of various kinds, and their research areas consist of both basic and applied sciences.

The fourth part is the research institutions of national defense which concern themselves with newly developed techniques needed for defense.

The fifth part is the research institutions subordinate to provinces, autonomous regions and municipalities directly under the central government. There are altogether 3,946 institutes with 313,000 S&T personnel making up 54 percent of the total S&T manpower in the country. These institutes are concerned mainly with applied research and development directly related to their local needs.

The highest governing body for science and technology in China is the Science and Technology Steering Committee of the State Council. The State Science and Technology Commission (SSTC) is the government agency responsible for implementation of science and technology policies, organization for attacking key problems of national importance, mastery of new technologies, review and sanction of inventions and for R&D budget allocation.

II. Reform of R&D Management System

The R&D management system in China is one that has been formed gradually over the years and was extremely effective in promoting the progress of science and technology in the country. However, with the new demand posed to science and technology by the reform of the economic system, and particularly with the challenge of new technology advancement worldwide, the defects in our R&D management system were becoming

more and more conspicuous. The main defects were: the state placed excessive control over R&D activities and, as a result, the research institutions did not have sufficient autonomy; while practicing centrally planned management, few research institutions had any links at all with industry; the transfer from research results to production was rather difficult; and it was extremely hard for S&T personnel to move from one institution to another. Before the reform went into effect, about 83 percent of the S&T personnel at various research institutes depended entirely on government funds. Chinese scientists and engineers are well known for their diligence and dedication; but in the past, just because of the defects in the R&D management system, their talent and wisdom were not fully utilized.

In an effort to solve these problems, the Chinese government in March, 1985 announced the Decision on the Reform of the R&D Management System. The present reform concerns mainly the following five aspects:

1. Reform of the Funding System in Support of Research

The government will continue to fund the institutes doing research in such areas as medicine and health, labor protection, agricultural technology, and environmental protection as well as astronomy, meteorology, standards and metrology, information, etc. These institutes, however, must accept the principle of block funding.

A part of basic research, some applied research and some large research projects will be supported through a grant system; the National Natural Science Foundation of China (NSFC) was established for this purpose in February, 1986. Through peer review, the Foundation selects the best proposals to support. Research and development of high technology with high risk will be financed directly by the government as well as by some venture capital. Research projects sponsored by the central and local governments will be funded under a contract system. The block funding for research institutes engaged in technology development will gradually be reduced year by year and, it is hoped that in about five years or more, these institutes will be self-supporting by engaging in contract research, providing services and technology transfer.

2. Commercialization of Technological Achievements

In the past, technological achievements were not transacted like commodities in the marketplace in China for they were not regarded as commodities. So for a long time technological achievements were transferred free of charge. Now China has created a technology market to commercialize technological achievements so as to ensure a continuous flow of technology from research institutions to industry, to agriculture and to the entire society.

3. Encouraging Industry to Absorb and Develop Technology

In China industries have been very weak in absorbing and developing technology. With the current reform underway, the government is, on the one hand, giving industries more and more autonomy, and on the other, encouraging industries to enter into partnerships of various kinds with universities, colleges and research institutes. The large enterprises particularly are asked to set up their own institutions for R&D activities, and the medium and smaller-sized ones are encouraged to set up R&D institutions jointly or to seek support from research institutes and universities and colleges. Now more and more research institutions and universities and colleges have entered into long-term or permanent collaborative relationships with industries, and some institutes even have been merged into large enterprises or enterprise groups.

4. Reform of S&T Personnel Management

In S&T personnel management, China will gradually adopt a retainer system; in the management of research institutions, a system of responsibility to the director of the institute will be introduced; reasonable mobility of S&T personnel should be allowed so that scientists and engineers are encouraged to go and work in the countryside, in the medium and smaller-sized firms, and in remote and less developed regions.

5. Strengthening Basic Research

In order to have a strong base for the development of science and technology, China will continue to strengthen its basic research. The government will increase its spending for basic research, increase personnel, and will improve facilities, instrumentation and other conditions for scientific research.

Quite a number of postdoctoral positions have been established in some research institutes of CAS and other agencies and in some universities in China. At the same time, basic research can be strengthened, and highly qualified S&T personnel can be replenished. The postdoctoral positions are focused on basic research and the scientists working in them are mainly those who have received their Ph.D.s recently from abroad.

Reform is progressing satisfactorily, but there are still many things remaining to be done, for instance, the drawing up of specific regulations for implementing the policies set forth in Decision on the Reform of the R&D Management System, the reinforcement of science and technology legislation, etc. Further efforts are needed in these areas so as to make science and technology better serve the interests of the country and the people.

III. Strategy for the Development of Science and Technology

The general strategic goal in China is to quadruple its 1980 industrial and agricultural output by the year 2000, with a preliminary foundation laid during the first decade (1981-1990) in order to achieve a more rapid and equitable growth during the next decade.

Guided by this general goal, China's strategy for the development of science and technology places strong emphasis on the application of proven technologies to raise the technical level of production sectors. Its general objective is to popularize, by the end of this century, those advanced production technologies which were used widely in economically developed countries in the late 1970s or early 1980s and which are applicable in China; at the same time, efforts should be made selectively in certain high-tech and basic research areas in order to catch up with the world advanced level. Therefore, national endeavors in science and technology will fall into four parts:

1. Transformation of Traditional Industries by Adopting New Technologies

In the present Chinese industrial structure, it is traditional industries that account for about 95 percent of the total industrial output. For a long time to come, traditional industries will continue to be the prime mover of the Chinese economy. To reach the strategic goal of quadrupling the 1980 gross national product by the year 2000, China will depend primarily on traditional industries. Therefore, the technological level of traditional industries and their production capacity constitute the lifeline of the Chinese economy. At the moment, technology in traditional industries is still very backward and labor productivity in China is also pretty low. Industries that have reached the world advanced standard of the '70s and '80s in terms of quality and performance account for only about 15 percent, while the technological level of the remaining 85 percent still remains that of the '50s and '60s and even '40s in some cases.

In the period from 1986 to 1990, 50 percent of the state funds for construction will be invested in the technical transformation of traditional industries. Hence, one of the most important tasks of the S&T endeavors in China at present is to serve this technical transformation by facilitating technology development, introducing foreign advanced technology, and providing better equipment for traditional industries.

In order to save time, the introduction of foreign advanced technology is of special importance. From 1981 to 1986, more than 3,100 technological items were imported at a cost of 2.9 billion U.S. dollars. Most of this technology has played and is playing an important role in production. For the period from 1986 to 1990, the expenses for technology imports will be doubled in order to introduce more advanced technologies needed for the development of industry and agriculture.

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2. The Spark Program for Development of Rural Industries

Rural areas, the home of 80 percent of the Chinese population, historically been backward. This situation must be put to an end or the modernization of the entire nation will be out of the question. Recently, thanks to the restructuring of the rural economic management system and reinvigoration of the urban economy, township enterprises have been set up across vast areas of the countryside and have played an important role in changing the structure of China's employment picture and the relationship between rural and urban areas. China had a labor force of 350 million engaged in agriculture. Now 80 million of them have been moved to manufacturing and tertiary industries in rural areas, the output of which in 1986 totalled 354 billion yuan, about 19 percent of the country's gross national product. Given the present momentum, that figure is expected to reach one trillion yuan by the year 2000, and these rural enterprises will be employing a total of more than 150 million people, accounting for roughly one third of the rural labor force.

Generally, the problems found in today's rural and township enterprises are outmoded technology, serious shortages of technical manpower and advanced equipment, and environmental pollution. In order to address these problems and enable those rural enterprises to develop soundly, the government has drawn up a special plan titled Spark Progrm. The prinicipal goal of the program is to start a number of "short, simple and appropriate, and quick" technological projects for rural development. "Short" means short cycle needed for technology development; "simple and appropriate" means that the technology to be adopted should be suitable for the present economic development and management in the countryside; and "quick" means that the projects should be able to bring about quick economic returns. By depending on this type of technology, a large number of rural and township enterprises and all professions and trades in the countryside will move step by step towards specialization and modernization.

The Spark Program has drawn enthusiastic support from all local governments and various central government agencies. Among the 4,000 projects with two billion yuan investment in 1986, 70 percent showed good results at the end of the year. Now the Chinese government has decided to make the Spark Program a main and long-term policy for invigorating the rural economy and one of the national strategies for the development of science and technology.

3. High Technology Development Program

For the long term, revitalization of the Chinese economy invariably hinges on high technology, and it was for this reason that the HIgh Technology Development Program was initiated in 1986. As an immediate part of the strategic objectives within this century, China's high technology research and development constitute a component of the Seventh Five Year

Plan (1986-1990). The projects outlined in the progrm are aimed at pooling the best technological resources in China over the next 15 years to keep up with international high technology development, bridging the gap between China and other countries in several most important areas, and wherever possible striving for breakthroughs. The program also aims at providing technological backup for economic development and training large numbers of talented individuals for the future.

There are seven priority research areas included in this program. Since China is at present not in a position to finance a comprehensive program that would include all branches within the seven areas, priorities have been assigned on the basis of the country's actual capabilities.

Biotechnology

The objective is to improve health through better nutrition by early in the next century. The following areas are included: high-yield, high quality and disease-resistant animals and plants; new medicines, vaccines and genetic therapy; and protein engineering.

Space Technology

Advanced launch vehicles with enhanced capacity will be developed to meet the growing demands for commercial launch services. R&D activities will continue on space science and technology for peaceful purposes.

Information Technology

Emphasis will be on technologies that promise significant breakthroughs and extensive application at the beginning of the next century. The areas included are: intelligent computer systems; optoelectronic devices and microelectronic/optoelectronic systems integration technology; and information acquisition and processing technology.

Laser Technology

R&D will be carried out in laser technology to achieve better quality and performance. Results will be applied to material processing, plasma technology, pulse power technology, high resolution spectroscopy, etc.

Automation Technology

This includes the two areas of computer integrated manufacturing system and intelligent robots.

Energy Technology

Coal-fired MHD power generation technology and advanced nuclear reactor technology are the two areas covered.

Advanced Materials

Major items included are: photo-electronic materials; high-performance structural materials with corrosion resistance and light weight; special functional materials; and high temperature-wear resistance and high strength composite materials with research on special testing and measuring techniques.

4. Support for Basic and Applied Research

Basic research is of far-reaching significance to the advancement of science and technology and to social and economic development. Major breakthroughs in basic research tend to result in major changes in technology. So China must have its own basic research capabilities. But given the limited funds available for S&T endeavors, China has had to establish guidelines limiting rsearch efforts to:

- research that will have long-term effects on future development of China's national economy and society;
- research that may contribute to the exploitation and utilization of China's abundant natural resources;
- those areas where China possesses a relatively strong capability with the possibility of breakthroughs; or
- research that will contribute to the enhancement of China's major scientific reserve.

At present, an *ad hoc* task force has been organized to make an in-depth study of the status of basic research in China in order to evaluate the effect of the reform of the R&D management system and to propose policy options.

Along with development of the national economy, government appropriations for science and technology will increase annually. In addition, with the reduction of direct support to technology development, China will, in such forms as grants and awards, increase allocations for important basic and applied research. Meanwhile, the government will renovate and build a number of laboratories in order to improve conditions for basic and applied research.

So the strategic deployment of China's scientific and technological activities comprises efforts at three levels. Efforts at the first level are directly concerned with serving economic construction, where it is hoped to deploy 70-80 percent of the S&T manpower. These efforts will be focused on some major national R&D projects that have a vital role to play in the country's industrial and agricultural production. Efforts at the second level are designed to develop high technology which is key to ensuring the future development of science and technology in China. Efforts at the third level are aimed primarily at strong support of basic and applied research in selected areas that have profound impact on economic growth and the enhancement of knowledge. So it can be seen that China's strategy for the development of science and technology meets specific conditions and has taken into account both long-range goals and short-term objectives.

IV. Scientific Exchanges with Other Countries

In accordance with the policy of opening to the outside world, China is also actively engaged in scientific and technical exchanges and cooperation with other countries. By the end of 1986, China had established relationships of scientific and technical exchanges and cooperation with 106 countries and regions and had signed official agreements for scientific cooperation with 50 countries. Chinese societies have also joined 250 international scientific and technical organizations. The annual number of S&T people coming to China and going abroad totaled about 40,000 in 1986. With such large-scale exchange programs, it is hoped that Chinese scientists and engineers can join hands with their colleagues in other countries in further heightening the level of international activities for the advancement of science and technology.

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DEVELOPMENTS AND REFORM IN GRADUATE EDUCATION IN THE PRC

Meng Yang

Introduction

The excellence of graduate education mirrors the level of research in institutions of higher learning and affects a nation's development of science and technology.

Reviewing the entire course of development of Chinese graduate education since the founding of new China—its ups and downs, twists and turns, progress and retrogression—one cannot help connecting it with the so-called "Cultural Revolution", which was actually the anti-culture movement. During this period, Chinese higher education suffered severe damage, with graduate education being the most stricken area. In 1949 when the Communist Party of China took over power, there were only 107 persons holding M.A. and Ph.D. degrees out of the population of about 450 million; ever since then the figure has grown steadily. By 1966, there were 23,393 graduate students enrolled and 16,397 of them received degrees. But for the entire eleven years of the Cultural Revolution, from 1966 to its end in 1977, the enrollment and the number of degrees granted were zero; faculties were condemned and disgraced; intellectuals became the target of the movement; there was prejudice against knowledge, and anti-intellectualism existed in society. The whole country was closed to the outside world. Any activities enhancing knowledge were considered foreign and antiquated. Tragically, some outstanding professors and researchers lost their lives; many were either physically injured or mentally affected. Those who did survive became professionally incapable of teaching for they had been alienated from the world's advanced skills and knowledge for so many years.

Graduate education in China was revitalized in October, 1977. After a year's preparation, enrollment resumed in 1978 and "Regulations of the People's Republic of China on the Granting of Academic Degrees" came into force on January 1, 1981. From that point on, Chinese graduate education started to set off on an entirely new journey. Incomplete statistics from 27 provinces, autonomous regions and municipalities indicated that, in 1978 alone, more than 63,500 candidates registered for examinations to pursue graduate studies. There were 210 institutions of higher learning and 162 scientific research institutions that accepted a total of 10,708 graduate students, which was seven times the figure of 1965. There has been a steady growth in enrollment since then. In 1987, more than 53,300 master's degrees were granted and 664 doctoral degrees. In the fall of this year, 394 institutions of higher learning and 355 research institutions enrolled 35,726 graduate students. Of this enrollment, 50% of the students have two years'

career experience and are registered as part-time students; 10.4% were recommended by the universities where they graduated with B.A. degrees, meaning that they did not have to take the entrance examinations. Of them, 95.5% are university graduates with B.A. degrees. (*People's Daily*, Overseas Edition, Nov. 9, 1987.)

Present Scale of Graduate Education in China

Today, 238 institutions, with 1,830 disciplines, have been authorized by the Academic Degree Committee of the State Council to confer doctoral degrees. There are 3,798 professors approved as qualified to advise doctoral studies and research. In addition, 545 institutions are authorized to confer master's degrees with 6,407 disciplines represented. (*People's Daily*, Overseas Edition, Nov. 15, 1987.)

Criteria for Enrollment and Institutions

With the rapid expansion of graduate education, China has focused on improvement of policies and criteria to guarantee the quality of graduate education.

The Chinese State Education Commission has issued the following stipulations:

(1). "Guarantee the Quality and Development Steadily" is the present policy concerning Chinese graduate education. All authorized institutions of research and higher learning should be governed by present conditions in terms of faculty, research facilities, budget etc. in enrollment planning.

(2). Graduate enrollment in each institution must be approved by the State Education Commission and become a part of national planning.

(3). In order to guarantee the development of graduate education, graduating students in regular universities and colleges may, half a year before graduation, register for graduate school entrance examinations; at the same time industrial and mining enterprises, scientific research institutions, governmental agencies, universities and colleges are required to take the interests of the nation into account and to give vigorous support to those who are qualified to take such examinations.

(4). Institutions conferring degrees are selected strictly, examined, approved and authorized by the State Council. The training of graduate students is usually conducted by integrating theoretical study with scientific research and integrating guidance from instructors with collective training given by teaching research sections.

(5). All Ph.D. students are required to master, besides the required courses, Chinese language and two foreign languages.

Reforms in Graduate Education

Along with economic reforms, there are reforms and achievements shown in graduate education as well.

(1). There is a new regulation on the age limit, which is that M.A. candidates cannot exceed the age of 35 and Ph.D. candidates cannot be older than 40.

(2). The Chinese Academic Committee of the State Council has initiated a new practice whereby 141 institutions of research and higher learning are authorized to offer degree programs to part-time graduate students who have at least two years of working experience. So far, 115 such students have been granted M.A. degrees and 10 Ph.D. degrees. It is estimated that by the end of this year, another several hundred part-time students will receive degrees. In the past two years, part-time students accounted for 50% of the total graduate student enrollment.

(3). In order to speed up the training of senior specialized personnel, the Chinese Academic Committee instituted a system in 1984 whereby graduate students who enrolled in an M.A. degree program could begin study for the doctorate ahead of schedule. The new system applies to a small number of graduate students who have a high degree of performance in the courses required for the M.A. degree, prove themselves highly capable in the initial stage of research work or thesis preparation, and have a real prospect of being trained for the doctorate. If they pass the qualifying examinations, they can start their studies for the doctorate while completing master's degree requirements.

(4). Some undergraduate students who enjoy a high degree of academic performance could be recommended by professors and institutions to become M.A. degree candidates immediately upon graduation without taking examinations.

(5). To enable graduate students to have more practical experience, this year more than 60 institutions of research and higher learning are encouraging newly accepted graduate students to obtain some working experience for a year or two before returning to pursue their degrees. Their files will be kept alive and no further examinations are required.'

(6). In China before the existence of graduate schools as such, graduate studies and research were administered at the institution level. Since 1981, however, many graduate schools have been established and are administering graduate education.

International Exchange

Someone once described China as a house with doors and windows shut tight. The house was cleaned time and again, but what people still valued most were the things inside the house. They simply moved things from one place to another.

Now China's open door policy has brought new information home. The environment for classroom teaching and scientific research in universities and colleges has altered significantly. Leadership at every level has focused its attention increasingly on the linkage of teaching, scientific research and national economic development.

Our universities and institutions of higher learning are strong in scientific research. Some of our sophisticated sciences are at the world level. The new policy has built a bridge for our faculty to interact with their colleagues abroad. More than 200 Chinese universities and research institutions have now established exchange relationships and joint research programs with about 150 institutions of research and higher education in the United States.

More and more professionals and researchers lecture abroad and attend international conferences. There are about 10,000 professionals and scholars participating in various exchange and joint research programs with universities and research institutions in various countries. About 20,000 professors, scientists, and engineers from other countries come to China for conferences, lectures or research programs each year. They work in more than one thousand colleges, universities, factories, industrial enterprises and so on. The majority of them have come from the U.S., Japan, West Germany, Britain, France, Switzerland, Italy and 50 other countries and regions. Through these activities we are well informed about the development of the world's advanced science and technology. Exchange programs are always a two-way street. We not only "import" advanced technology but also "export" our own. Such international exchange has given great impetus to the advancement of Chinese graduate education.

Much progress has been made in our higher education. Many universities have modified the structure, administration, and curriculum, and have made adaptations from classroom teaching to scientific research. Faculties have reset their research programs and adopted projects with the focus on future development. Our universities have established 571 research centers with national industries for various joint research projects.

Chinese universities also accept international students. Until now, we have accepted more than 35,000 international students from 114 countries and regions. In this year of 1987, there are 7,000 international students studying in 195 disciplines on 95 campuses in 17 cities in China.

Every year more than 2,000 international students receive scholarships from the Chinese government. In the fall of 1987, about 70 international students registered for M.A. and Ph.D. degree programs. Many of them are now holding important and prestigious positions in their own countries.

Although tremendous efforts have been made in the restoration and development of Chinese graduate education, the tasks facing Chinese educators and administrators to improve graduate education further are still enormous. We need more qualified professors and professionals, more and better research facilities and more vigorous support from the people. It is predicted, by both Chinese and foreign scholars, that in about five years, China will need a great number of well-trained personnel in marketing research, vocational education, agricultural research, industrial administration and management, legal services, architecture, hotel management, tourism, sociology and psychology.

Zhao Ziyang, the general secretary of the Communist Party of China, maintains in his report at the 13th National Conference of the Party that:

> "Basically, the development of science and technology, the revitalization of the economy and indeed the progress of the whole society all depend on improving the quality of the work force and training a large number of competent personnel. Education is of fundamental importance to the fulfillment of our long-range mission. We must therefore continue to stress the strategic role of education."

China has the world's largest population; one out of every four people in the world is Chinese. The problem of feeding and clothing a billion people has basically been solved and living standards are rising every year. However, unfortunately, a quarter of our population is still illiterate or semiliterate. This slows down the development of our productive forces. Therefore, education is an urgent and most important issue for us. Now we attach as much importance to education as we do to national economic development and orient our work to the needs of modernization, the world and the future. We are constantly striving to improve our graduate education.

CHINESE ENGINEERING EDUCATION: THE DEVELOPMENT OF GRADUATE AND UNDERGRADUATE STUDIES

Halsey L. Beemer, Jr.

I am pleased and honored to be invited to the Annual Meeting of the Council of Graduate Schools to speak about Chinese higher education and the reforms that have taken place in that system over the last ten years. For the last five years I have been working closely with the Chinese State Education Commission on two World Bank supported projects to strengthen both undergraduate and graduate education in China. For the last two years this effort has been focused on Chinese Engineering Education and the reforms and constraints to implementing those reforms. Today I will be

giving you a few personal thoughts on the subject, comments which are my own and do not represent the Chinese government, the World Bank, the International Advisory Panel of the Chinese University Development Project II of which I am the Executive Director, or the National Academy of Sciences where I work.

In dealing with educational exchanges between American and Chinese institutions, or the placement of Chinese graduate students in American universities, I feel it is important to understand the educational background of the Chinese graduate students and visiting scholars who are in your institutions or who are likely to come to your institutions. This is especially true in engineering education where the differences between Chinese and American institutions are great.

As China modernizes its economic and political structure, the demands for trained manpower to guide this modernization are large and varied. The challenges of expanding both undergraduate and graduate education to meet these manpower goals are formidable in both scope and scale. The Chinese State Education Commission has studied these problems and challenges and has created plans for meeting them. I would like to talk today about these demands, challenges and plans.

First of all, it might be helpful to lay out the topology of Chinese higher education. Currently there are approximately 1,000 institutions of higher education in China; the figure presently being used is 1,063. Every time one sees a figure on the number of institutions of higher education in China the figure is slightly larger. This number has grown from about 600 in eight years. There are nearly two million undergraduate students in China and approximately 120,000 students studying for advanced degrees. Since 1979, more than 2.7 million people have graduated from four-year and junior colleges, a number equal to those who graduated in the previous thirty years. This year, colleges and universities will enroll some 640,000 undergraduates and junior college students or about a quarter of the 2.48 million graduating senior middle school students.

- approximately 40 universities and colleges are controlled directly by the State Education Commission
- approximately 300 universities and colleges are controlled by line ministries of the central government
- approximately 700 institutions of higher education are controlled by local governments—provincial and municipal

Another way to slice up the higher education pie is to look at the specific focus of the institutions.

- some 45 of the universities and colleges are comprehensive institutions, teaching a broad cross section of sciences, engineering, liberal arts and humanities;
- approximately 270 of the universities and colleges are engineering-oriented institutions;

- approximately 64 universities and colleges are economics and finance-oriented institutions;
- there are other specialized institutions devoted to training teachers, medical personnel, agriculturalists, the military, specialists in the fine arts and so on.

Now that the current statistical map is drawn, it is useful to look briefly at how this developed. In this area I am indebted, in part, to the insights of Professor Ke Jun, of the Beijing University of Iron and Steel Technology, and an eminent scholar in the history of science and engineering.

As most of you are well aware, the post-1949 reorganization of the Chinese higher education system, by and large, replaced the American and British models of higher education which had largely prevailed since the 1920s with continental models which came to China by way of the Soviet Union. This replacement of one model for another was especially apparent in science and engineering education.

It is important to remember that these new continental/Soviet models had, in turn, come from the experience of post-revolutionary Russia and its new educational system which had borrowed heavily on the early 20th century German system. In the case of both Chinese and Russian post-revolutionary societies the needs for quickly produced and narrowly trained specialists to manage rapid industrialization, increase agricultural production, and run the national economic planning mechanism needed in a centrally planned economy were taken as the primary goals of higher education.

In post-1949 China, the tasks of higher education were divided between the Ministry of Education which organized and administered a relatively small number of comprehensive universities, and the line ministries which were given the responsibility of training a substantially larger percentage of the manpower needed to run the society and economy. Priority on basic research in the natural, engineering, agricultural, military and medical sciences was given to the newly expanded Chinese Academies of Science, Agriculture, Medicine as well as research units directly tied to line ministries. Graduate education, because of its lengthy and expensive process, was little emphasized and took on the continental flavor of a relatively small number of full professors supervising a small number of graduate students.

Some of the results of this reorganization of higher education were a separation of the teaching from the research process, a fragmentation of study courses, and a narrowing of degree-granting specialties. All of these changes reflected the perceived needs of the day and the models available from the continental/Soviet experience. In the early 1950s China lacked the funds, the faculty and the luxury of time to organize large-scale graduate education or professional training. In building engineering curricula and universities, they developed narrow, five year technical

training programs and sent graduates directly to factories where they would be able immediately to assume responsibilities which contributed to the critical tasks of creating a socialist country.

To illustrate the effect of the organizational reforms, it might be useful to look at a particular curriculum. In the early 1950s, the Chinese government decided that it needed trained engineers for the iron-making industries—people who knew how to organize the daily operations of such a factory and do the necessary design work to support such operations. The needs of the rapidly expanding iron industry were great and immediate. It was felt that these engineers would have no need to know anything about the steel industry.

Therefore, Chinese educators, in creating a curriculum for the training of such iron-making engineers, took the Soviet iron and steel curriculum and sheared from it the steel making courses. But the Russians themselves, confronted in the early 1920s by similar constraints of time and resources as their Chinese colleagues of thirty years later, had done the same type of surgery on the German metallurgy curriculum from which they borrowed heavily. What had started out in Germany at the turn of the century as a curriculum encompassing ferrous and non-ferrous metallurgy, mechanical forming, and metallography was in its Soviet version, split into ferrous and non-ferrous curricula. And now, the Chinese educators further split the ferrous curricula into iron making, steel making and electro-steel making. The narrowing of curriculum specialization was striking.

But it is not only the post-secondary curricula which must be studied when one considers the effects of the post-'49 reorganizations on Chinese education; one must also study the primary and secondary educational systems. The German gymnasium system of thirteen years of strong general education with major components of math and science allowed for the development of relatively narrow specialties when the students went onto the University. But when the post-1917 Russians took the German curriculum as a model, they cut from thirteen to ten years the combined primary and secondary curriculum, thus eliminating some of the academic breadth that a German university entrant had when he or she graduated from gymnasium.

What this produced in the early post-revolutionary Soviet Union was engineering curricula which contained only enough basic science and math necessary to underpin the rather narrow focus of the technical part of the curriculum. Without the thirteen years of the German gymnasium curriculum, but rather the ten year Russian system, the newly minted Russian engineers became excellent if narrowly focused technicians by and large lacki..g the strong scientific background necessary to take their own engineering disciplines beyond the level to which they had been trained in university. In a technological world which was moving relatively slowly, this did not pose a great problem.

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Interestingly enough, the Chinese post-1949 reforms did not drastically change the number of years for Chinese primary and secondary education—it stayed at twelve years—but many Chinese educators will say the reason the Chinese educational reforms did not emulate the Russian system of ten year primary and secondary education was that an additional two years is necessary to learn the ideographic Chinese langauge.

Additionally, Chinese students in their primary and secondary school years spend a good deal of time studying foreign languages—mostly English—which again substantially cuts into their class hours. Therefore, there are many Chinese educators that believe the Chinese twelve year primary and secondary curriculum is essentially equivalent to the Soviet ten year curriculum in its narrowness and incompleteness.

Chinese graduate education after the post-'49 reorganization, whether in the comprehensive universities, or the universities and institutes run by the ministries or the various academies, was small in scale, extremely narrow in scope and tended to reflect the needs of a rapidly industrializing society. Line ministries set curricula and graduation requirements. It was possible to get a Ph.D. in railroad bridge building, or cannons and automatic weapons design, or sugar refining engineering. Full professors were the only ones who could supervise Ph.D. candidates. The number of graduate students was very small. Interdisciplinary flexibility was virtually nonexistent. The financial resources devoted to graduate education were limited. Graduate students stayed on at the universities which trained them and became faculty members.

Graduate education in the 1950s was plagued by a shortage of teachers. As a result of this shortage, and the increasing narrowness of the course offerings in the university system now divided between comprehensive and technical universities, recent B.A. and B.S. graduates were teaching and supervising graduate students. These "teachers" had never had to do graduate research, and therefore none had new knowledge based on original research results to pass on to their students.

Moreover, these B.A. and B.S. graduates had not been trained in research methods; laboratory time had been spent in learning how to teach the standard set of nationally prescribed experiments to be done in a science or engineering curriculum and not in how to carry out original research. This first corps of post-'49 university teachers became the transmitters of knowledge that they themselves had received rather than creators of new knowledge. Therefore, inculcating into their own graduate students the methods of original scientific research was a difficult task.

Likewise, laboratory equipment at the universities was suited for learning how to do the required curriculum of undergraduate science and engineering experiments and not for original research.

In engineering education, both at the undergraduate and graduate level, there was an additional problem. When the university system was split into

the comprehensive and technical universities, the bulk of the basic science faculties stayed in the comprehensive universities. This resulted not only in narrowly focused specialties as has been mentioned earlier, but also a weakness in the teaching of the basic sciences in the technical universities. Chinese educators agree that this type of specialization was necessary in the early days of building the socialist economy, but that it does not serve the needs of a country facing the challenges of the 21st century.

There were two other policies in Chinese higher education which came from the Soviet model: central funding from the Ministry of Education or the line ministries which controlled the universities and colleges, and job assignment of graduates by the same instrumentalities.

These policies encouraged a narrowness of disciplinary focus: the Ministry of Railroads produced civil engineers who were trained in building railroad (and not highway) bridges. The Ministry of Electronics assigned graduates from their ministry-controlled universities to work in ministry-controlled factories, assignments which were based on the immediate manpower needs of the electronics industry.

This need to train for immediate manpower requirements and job placements often froze the graduate to a rapidly obsolescing technology while not providing him the broad-based education necessary to adequately deal with a changing technological environment.

As long as China had a centrally planned economy, this system had certain efficiencies—there was a system to produce the manpower that was necessary to lead the country. However, when China came out of the disasters of the Cultural Revolution, the Chinese leadership faced a different set of problems. Not only were the universities in a shambles but the economy was moribund and was judged not to have the resiliency to cope with the basic challenges of feeding its one billion citizens or taking China into the 21st century as a developed country.

The leadership saw that, if anything, it was falling behind in such basic areas as grain production per capita. The examples of other Asian economies such as those in Japan, Korea, Taiwan and even tiny Hong Kong made it clear that massive changes were going to be necessary to move the country forward. You are familiar with the decisions they took: incentives were introduced into agricultural production; factory managers were given responsibility for producing products which would generate profits for the unit; administrative responsibility for a whole range of activities was developed from the center in Beijing to the provinces and cities; attempts were made to limit the power of the Communist Party and increase the power of an increasingly professionalized administrative elite; and universities were given more individual budgetary and academic responsibility. The rule of law in society is being increased. Concern with environment is growing. China needs citizens with different constellations of skills and the Chinese education system needed to be reformed to provide those skills.

The educational reforms introduced since the Cultural Revolution can be seen as efforts to enlarge the limits of authority of Chinese educators to run their own institutions.

1. The limits of authority for Chinese institutions of higher education in running their institutions are being enlarged. Universities can, for instance, join into partnerships with organizations to train graduates and do research. These partnerships yield sources of new funds and job placements after graduation. Universities can accept funds from outside organizations for research projects.
2. The limits of authority of institutions of higher education in personnel appointments are being enlarged. Except for university presidents and vice presidents who are still appointed from Beijing, all other appointments or removals are in the hands of the institutions themselves. In some experimental universities vice presidents will be appointed by the universities themselves. Within the scope of state authorized size of staff and salary scales, the universities have the right to recruit faculty and staff members as well as "reassign reluctant personnel."
3. The limits of authority in handling operating expenses are being expanded. Universities are now getting less and less from the center and are more and more responsible for securing their own funds. This means they are increasingly responsible for balancing their own budgets, being able to keep and use surpluses and having to make up for overspending.
4. The limits of authority for handling construction will be enlarged. Through an increased use of competitive bidding and the authority of universities to sign their own construction contracts, the universities are beginning to assume increased responsibility for capital construction. Surpluses or losses which result from these contracts are increasingly the responsibility of the university and not the central government.
5. The limits of authority for recruiting freshmen into universities and colleges are being expanded. Not only will the grades from the nationwide examination system be important but recommendations from secondary school teachers and the secondary school grades will also be taken into consideration. Advanced placement of incoming freshmen will now be possible.
6. The limits of authority for the universities to find positions for their graduates are being expanded. Universities are experimenting with assignment processes which take into consideration the needs of the work units and the interests and training of the graduates.
7. The limits of authority in promoting and granting academic titles are being enlarged. Most universities can now assign faculty members at the level of associate professor. Some prestigious universities can make assignments of full professors. Promotion will increasingly be

based on the merits of scientific research, the number of courses taught, textbooks written and feedback from students.

8. The authority to implement salary reform in the universities is being enlarged. The improvements in salaries will be pegged to the national efforts to reform the national wage and salary system.

In the area of curriculum reform, the institutions of higher education and the State Education Commission are working together. The Chinese State Education Commission retains the primary responsibility for setting national educational policy, and for monitoring the overall efforts to improve the curricula for all institutions of higher education in both the comprehensive universities which they directly control and in the universities and colleges controlled by the line ministries. The SEdC has set out to cut down the number of narrow specialties in which graduates can get degrees. This has been especially true in the graduate programs where there are now some 638 specialties in which degrees are given, and that number is to be cut substantially.

But the issue is not just combining narrowly focused specialties into broader disciplinary groups, but also to allow for the growth of new fields which are more often than not interdisciplinary in nature. The complexities of the modern world do not present themselves in discreet disciplinary segments. The narrow older curricula do not lend themselves to the broader interdisciplinary needs of the 21st century.

And so the Education Commission, while cutting down on the number of specialties is also strengthening the basic course offerings in all curricula. In the sciences and engineering this means a substantial effort to increase the number of basic science, math and computer courses for all science and engineering majors.

In confronting this challenge of increasing basic courses the SEdC has the problem of finding qualified staff to teach the courses. In the past, if these basic courses were taught at all, they were taught by the least qualified teachers with the lowest pay, prestige and training. Now there is vast need for this type of staff and they are in desperately short supply.

Additional problems face the SEdC. In an effort to assure the quality of graduate degrees, only full professors have been able to supervise Ph.D. students, and associate professors master's degree students. This has meant that in the first two batches of graduate students which have rececived master's and doctorates between 1981 and 1986, there were around 1,700 professors entitled to supervise doctorate students and during that period of time, they produced only about 1,100 Ph.D.s. The number of master's degree students produced in that same period, somewhat more than 4,200, is similarly small.

Not only are the numbers small, but the SEdC recognizes that their effort to maintain high quality of Ph.D. supervision has also prevented many Chinese academics who have recently returned to China with advanced degrees from supervising new Chinese graduate students. As one

can well imagine, the Chinese professors entitled to supervise Chinese graduate students are not necessarily the repositories of the most recent learning in a given subject. This is especially true in fields that moved rapidly during the Cultural Revolution when all international contact was cut off for Chinese academics, fields such as molecular biology or artificial intelligence.

The SEdC is creating ways to bring the younger, more currently trained academics into the graduate student supervision role, but it is a slow process and one that makes many Chinese graduate students studying in this country now wonder what role they will fill when they return to China.

There is another problem that the SEdC faces and is dealing with. As Chinese universities, like virtually all other institutions in China, are given more and more discretion in decision-making, they have also been given more and more responsibility for managing their own budgets. Along with this increased flexibility at the university level has come less money from the State Education Commission and more attempts at finding alternate sources of funding.

In the case of universities which have been under the budgetary control of line ministries, the effect has been most directly felt. Those ministries which have used universities to train the managers and engineers and administrators for their own enterprises still feel they need graduates who will be able immediately to fill existing manpower needs in factories, enterprises, banks and ministry offices. The pressure from these ministries continues to be to request narrowly trained specialists who fit job descriptions within their ministry. The pressure is matched with financial support for the training of these specialists. Chinese institutions do not have internal training capabilities such as exist in Japan and the United States and so these universities are under substantial pressure to heed their ministerial guidelines.

The SEdC recognizes that training programs such as these will create administrators, managers, engineers, scientists and so on with the capability of dealing with the jobs of today but not those of the 21st century. The half-life of an engineer trained in such a fashion is perhaps ten years. The system is recognized to be expensive and wasteful often resulting in the mismatch of narrowly-trained specialists in jobs that will rapidly change as the Chinese economy and policy change.

As one can quickly see, the challenges which face the Chinese State Education Commission are great, but the Chinese educational system is, I believe, equal to the task. The Commission, which was created to deal with just such over-arching issues as ministerial control over specialized schools or the creation of new curricula to deal with the problems of the 21st century, has, for example, undertaken a major effort to strengthen and reform Chinese graduate education.

Plans are now being made to earmark, starting around 1990, more than US$120 million to strengthen graduate programs in universities and

research institutes of the Chinese Academy of Sciences as well as line ministries. Approximately 100 graduate studies programs will be targeted for strengthening. As one would expect, the great preponderance of the graduate programs will be in the sciences and engineering with a small number in the social sciences, medicine and agriculture.

The primary goal of the project is to increase the stock of university and college teachers as well as the ranks of researchers and graduate engineers. A secondary goal of the project is support for graduate level research.

The choice of the 100 graduate studies programs will be a difficult task for the Chinese academic community but through a process of self evaluation and peer review the existing 1,500 graduate programs have already been narrowed down to approximately 300. Priority is being given to existing strengths, pioneer areas and interdisciplinary fields. Since only two-thirds of the current graduate programs are in universities and the rest are in research institutes of the Chinese Academies of Sciences, Social Sciences, Agriculture and Medicine, as well as line ministries, resources will also be distributed to non-university programs. An early reading of the criteria used to make decisions in the process indicates that priority will be given to institutions which share resources in programs such as open laboratories and joint degree programs.

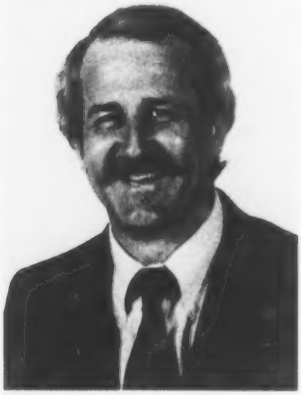
Programs such as this indicate to me that the Chinese academic community is fully aware of the tasks it has to face in training its future generations and is equally aware of the challenges of preparing for the 21st century. They know well the hurdles they face—most of them were trained in the system they now try to reform—and understand the constraints that the existing system places on their efforts. But they are also confident that they are part of a movement that is committed to changing the Chinese society and economy, and they are confident that they can succeed. I share that confidence.

The views expressed in this article are those of the author and do not represent the views of the National Academy of Sciences or the National Research Council.

MORE CONCURRENT SESSION SPEAKERS

Donald G. Dickason
Vice President of College and University Services
Peterson's Guides

Barbara Solomon
Acting Dean of Graduate Studies
University of Southern California



David E. Lopez
Associate Dean, Graduate Division
University of California, Los Angeles

Roy Koenigsknecht
Dean of the Graduate School
Ohio State University

5. RECRUITMENT OF GRADUATE STUDENTS

Presiding: Larry J. Williams, *Dean of Graduate School and Research, Eastern Illinois University*

Speaker: *Donald G. Dickason, *Vice President of College and University Services, Peterson's Guides*

Discussants: Paul Bryant, *Dean of Graduate College, Radford University*
‡Thomas P. Hogan, *Dean of Graduate School, University of Scranton*
William H. Matchett, *Dean of the Graduate School, New Mexico State University*

GRADUATE IDENTIFICATION, RECRUITMENT AND ADMISSIONS PROGRAMS BEGIN TO BE

Donald G. Dickason

The title of this presentation has been chosen overtly, since most graduate units do *not* consider the specifics of identification, recruitment and admissions as identifiable parts of an overall program—so think IRA! A review of the literature indicates that the *published* body of information is made up of only three items. There were two in 1987, and one in 1985. (See references.) The other "research" consists of visits to 36 colleges and universities and 275 graduate departments in 1987, and experiences at the undergraduate admissions level at two major universities. Also Peterson's Guides conducted two surveys, one of current clients, and one of non-clients.

There is the emerging awareness that general admissions and recruitment principles, developed at the undergraduate level, can be used at the graduate level, recognizing of course that the applications must be quite different. Three of these general principles can be described in very basic terms, the three laws of your "IRA":

1) First Law: "You can't admit someone who hasn't applied".
2) Second Law: "A student can't apply unless he or she has heard of you".
3) Third Law: "It cannot be assumed that those you want to admit have heard of you or your program".

General conclusions which arise from travels, research and surveys include: 1. Neither locus nor amount of responsibility for graduate recruitment and admissions is consistent. 2. Efforts needs to be recognized, but units don't know how to do it. 3. Units are unaware of how graduate students

*Abstract given here. A summary of data used as background for this presentation and/or a detailed outline may be obtained from author on request.

‡Abstract given here. Copy of complete presentation available on request from presenter.

hear about an institution/program/department, how they learn about qualities of an institution/program/department and how they decide which program to choose. 4. Resources are not separately budgeted. 5. For many departments, there is great ambivalence about international students. Some like the students and want the internationalization. Others have too many international students, not enough U.S. students. 6. A very high proportion want systemized access to U.S. undergraduates. 7. Most departments know the problems associated with enrolling minority graduate students; few, if any, are doing anything systematic about it. 8. Peterson's non-client surveys show that 1:4 are interested in international students. 9. From non-client surveys—1:5 are interested in graduate recruitment workshops. (The author has conducted six individual university workshops plus some that include multiple institutions.)

Graduate *schools* which have some centralized responsibility for graduate recruitment operate at five different levels. 1. Do *nothing* except pass paper through to the departments. 2. *Permissiveness:* that is allow the graduate units to do whatever they want, so long as they report to the graduate school. 3. *Encouragement:* stating the importance of enrollment plans, providing information about institutional goals and priorities, etc. 4. *Support:* providing fiscal support (either as matching grant or proposal funding), training, materials, and staff support for departmental plan development and enrollment activities. 5. *Total recruitment:* a centralized office is responsible for identification, recruitment, selection and enrollment functions.

There is an emerging taxonomy for graduate recruitment. Elements include: 1. *Contact* status, that is whether through *referral* by an existing network of faculty members or through other recruitment and more *random* methods. 2. *Discipline* status, that is, whether from the department's own discipline *or* from disciplines other than that of the receiving department. 3. *Student status*, that is, coming directly from undergraduate full-time enrollment or from non-immediate postbaccalaureate study, part-time, or other. 4. Students internal to your institution, *or* students from other institutions. 5. Career changers *or* career enhancers. 6. Foreign *or* domestic. 7. Master *or* doctorate. 8. Research interests or practical *or* applied interests. 9. Minority/nonminority. 10. Men/women.

The first two elements, contact and discipline status, are the two most definitive in building a graduate recruitment taxonomy. *Contact status* defines the degree in which a unit has candidates referred to it as opposed to the always present "random" candidates, who come from outside of the referral network. The *discipline status* measures whether the candidates do (or must) come from the same undergraduate discipline as the graduate discipline. (Doctoral degree disciplines match the undergraduate discipline of the recipients in only 55% of the cases.)

Virtually all would-be-graduate students go through the following stages: awareness, prerequisites satisfied, desire to pursue graduate study, familiar-

ity (with your program), and commitment (to your program).

Virtually all successful graduate departments have plans which consider the following steps in order to enroll the students they desire: prospects, eligibles, inquirers, appliers, selecteds, entering students, graduates.

A number of major issues emerge: 1. *Personalized contact* is one of the key issues at every stage of graduate recruitment. (Note the interaction as illustrated by Baron and Kind.) 2. The *quality of the faculty* and its research and scholarly activities and how they are represented are key. 3. *Students are predictable* in how they use published resources about graduate study. 4. *Tracking systems* are critical for recruitment as well as admissions. 5. Graduate units should overtly consider how they do or should attract students from *disciplines other than their own.* 6. There is an emerging group of *graduate admissions professionals.* Five years ago there were few; now there are more than 200 across the country.

Minority recruitment concerns are everywhere. These efforts are, for the most part, misdirected. Most efforts are directed towards "getting more" of the current pool of graduate-bound minority students. Very little effort is put toward increasing the pool. Of 250 departments visited, fewer than ten considered this their problem. It "is lamentable"—but with a sincere shrug of the shoulder, "there is nothing that we can do about it!!" Faculty must be helped to realize that they are part of the problem, not the solution if they do not individually accept responsibility to enlarge the pool by proactive steps.

To that end, disproportionate numbers of minority students go to two-year colleges. That has been decried as bad. One solution is to go to community colleges, find the able students, act as mentor, and reassure and captivate those who have the capability of four-year programs and therefore graduate possibilities.

Many are concerned about the lack of supply of U.S. students for graduate study. A data-based network beginning in 1988 will permit graduate units to initiate contact with undergraduate disciplines—in field, out-of-field, and from schools not normally connected.

In summary the increase in graduate enrollment and recruitment plan is real, significant, but not well ordered. Graduate deans, such as those represented at this meeting, can't *do* it all. But graduate deans can and must be the catalysts so that proactive, logical graduate enrollment programs are put in place.

HELP your Graduate IRA plan happen. Help *I*dentification, *R*ecruitment and *A*dmissions plans happen . . . at the institution level . . . at the school or college within the institution level . . . at the departmental or program level.

DETERMINE the characteristics of the students you want to educate.

REMEMBER the 3 laws of admission:

- you can't admit someone who hasn't applied.
- a student can't apply who hasn't heard of you.

- the ones you want to admit are not necessarily those who have heard of you *and* have applied.

Add the basic corollary to all of this: *"Those who leave enrollment management to chance, leave enrollment to chance."*

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GRADUATE RECRUITING: NEW WINE IN OLD BOTTLES

Paul T. Bryant

As demographic trends turn downward for the age group that is traditionally the source of graduate students, as enrollment of American students drops in some fields, and as governing boards, commissions on higher education, and legislatures increasingly quantify accountability, graduate schools have discovered the virtues of recruiting.

Self interest is an obvious motive—graduate administrators and faculty would like to keep their jobs—but there are more significant reasons for recruiting: our society needs a continuing supply of highly qualified scholars, researchers and practicing professionals in the fields taught in our graduate institutions. We need the next generation of teachers for those graduate programs. And our graduate faculty and students make major contributions to continuing reseearch. Put simplistically, graduate study offers the most effective way to push our national brainpower to its highest levels. On the more personal level, graduate study allows students to push their individual capabilities to their highest levels, too.

Only recently, however, have we begun to move toward effective recruiting of graduate students. Many of our faculty still rely on their experience as graduate students in the 1960s and early '70s, and assume plenty of qualified students will apply each year. Indeed, they may resist active recruiting as unseemly hucksterism, quite beneath their dignity. In some cases there may be no cure for this attitude, but some faculty will respond to a strong dose of the facts of the case—a review of the numbers, and of the consequences those numbers can create. In other cases, asking a faculty member to come along to a major graduate school day or other recruiting event may stimulate attitude changes. Seeing the recruiting efforts of other institutions, especially some of the most highly respected, has converted some of my

most skeptical colleagues into believers.

The question of the amount of recruiting varies with the field and the department's size and resources. Upper limits to graduate enrollment may be set by the number of faculty available for graduate advising, or by the number of laboratory spaces available to graduate students, or possibly even by the number of seats in graduate courses the department can offer in a given term. When enrollment exceeds some such limits, the quality of the graduate student's experiences in the program will deteriorate rapidly, and an overloaded faculty may lose enthusiasm for the program quickly. When upper limits are exceeded, it is not time to stop recruiting, but rather time to make admission standards more selective.

Lower limits on graduate enrollment are more difficult to define, but are also significant. Too few students in a program will restrict the number of courses that can be offered, making it difficult for students to get the variety of courses each might want individually, and possibly even making it difficult to graduate in a reasonable time. One of the best informal sources of learning for graduate students is other graduate students—in classes, in seminars, in research projects, over coffee, in shared offices. If numbers drop, this interchange may be limited or nonexistent, and students may miss an important part of the graduate study experience.

Worst of all, if graduate enrollment is too low, so that only two or three students want a given course, there is the temptation to offer that course as an overload. A good natured faculty member, moved by the pleas of one or two students, may agree to offer the course for them, over and above the normal teaching load. Department chairs are tempted to take advantage of such good nature and push graduate courses more and more into the "overload" category. The ultimate result, of course, is faculty resentment that finally looks upon graduate courses, and graduate students, as a nuisance and imposition. Then it is time either to get more students or abolish the program.

There is a difference between the types of recruiting needed by major, internationally known research universities, and the needs of smaller, less widely known, and perhaps master's only, schools. The major schools do not need to explain who they are or what general programs they offer. Instead, they can focus on specialized areas, and on research opportunities and financial assistance. Smaller schools, on the other hand, need more "institutional" advertising just to let prospective students know of their existence, of the fact that they offer graduate study, and of the range of fields in which they offer it. This kind of general advertising, the initial creation of an awareness of an institution and its programs, and the development of some sense of what that institution is like, is difficult to evaluate in terms of short-term results. MIT may be able to send out a flyer announcing research assistantships in a specific laboratory, count the number of applications for those assistantships, and have a useful measure of the effectiveness of the flyer. Radford, on the other hand, may be sending out flyers to make pros-

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pective graduate students and professors on other campuses aware that the University has a given laboratory and offers graduate work in that field. Radford's flyers may produce increased applications that year, but they may also produce longer-term effects two or three or more years into the future, just by giving the University new visibility. In such instances, the growing trend of evaluating recruiting efforts on short-term measures should be considered carefully and not always taken as a full measure of results.

Graduate student recruiting should be coordinated through the graduate school office for a number of reasons. Not every individual department will have either the knowledge of or the interest in recruiting, whereas the graduate school office can develop the expertise and then use it to assist many departments. Recruiting efforts in closely related fields can sometimes be combined or coordinated with an increase in effectiveness and a saving of money and effort. And the more general, "institutional" type of information efforts are more likely to be presented in a balanced, consistent way by a central office rather than by many individual departments. Finally, "general" recruiting opportunities, such as the CGS/GRE Forums and campus-wide Graduate and Professional School Days, are usually more effectively used by institutional representatives who are broadly informed about all graduate programs on a campus.

Such general recruiting efforts, however, must be supplemented by work at the departmental or program level. Individual faculty members should be encouraged to establish and maintain contact with colleagues at other schools, to see that they know of the graduate program and refer their students to it. Through professional acquaintances they can tap into non-student pools of potential graduate students such as public school teachers, practicing professionals in the field, and private companies. They can give personal, individual attention to inquiries. And they can see that students in their program—graduate and undergraduate—have a good educational experience. In particular, they can make sure that the best of their own undergraduate students are encouraged to consider graduate study. It makes little sense to send representatives to the far corners of the country looking for graduate students if we neglect those on our own campuses. If a department prefers not to have its own undergraduates in its graduate program, on the ground that the students should be exposed to a different faculty, then perhaps reciprocal relationships can be developed between that department and strong departments elsewhere, to send each other their best students.

Besides the graduate school office and the departmental faculty, there is another resource for recruiting graduate students that should not be neglected: the alumni from the program. A graduate who is proud of his or her degree, who feels well prepared to succeed in the field, who has a high regard for the faculty and the institution, is probably the best, most persuasive advocate a program can have. Alumni often feel complimented to

be asked to assist in recruiting efforts, and they may have a credibility with prospective students far beyond any possessed by a faculty member or someone from the graduate school office.

Recruiters must become aware of the potential sources of recruits—of the "pools" of eligible prospects from which recruits may be drawn. We have already glanced at some such pools: undergraduates at our own institutions, undergraduates at selected other institutions, professional groups outside the colleges and universities. There is another kind of pool that is becoming increasingly important, but to which we are not yet devoting enough attention. In nearly all fields, minorities—particularly blacks, hispanics, Native Americans—are not yet adequately represented in our graduate programs. In some fields, women are not yet adequately represented. Tapping these pools is a complex and difficult task, and some institutions are already making substantial efforts to do so, but the entire graduate study community needs to join in that effort, in conjunction with efforts at the undergraduate level and in the public schools. As these groups become a larger segment of our population, it will become more and more necessary to see that they share fully in our educational and economic opportunities. The scope of this brief paper does not permit adequate treatment of the subject of recruiting underrepresented groups into graduate study, except to note that such recruiting requires a special and sustained effort. Graduate schools cannot assume that a general recruiting effort will be sufficient to reach and attract students from these special groups. If they could, there would be no problem of underrepresentation.

Further, if women and minorities are to be recruited in increasing numbers into programs in which they are not now well represented, the schools doing the recruiting must take responsibility for providing adequate academic and social support mechanisms for students thus recruited. Recruiting such students into a program where they are not already well represented, then throwing them into the pool to sink or swim with all the other students, is unfair to the students and will, in the long term, create greater problems than those that such recruiting is intended to solve.

International students provide another source of graduate students, and here the picture is varied. In some fields, at some institutions, there is an embarrassment of riches, and some programs may need more American students to balance their international enrollment. In other programs and at other institutions, the addition of international students might provide a valuable variety and increase the cosmopolitan atmosphere of the campus. Whatever the individual case, graduate programs should recognize realistically that international students will place additional demands on the system, and they will need adequate support services to meet their needs while they are on the campus. Recruiting international students without providing such extra services is asking for trouble, and is unfair to the students recruited.

Whatever the group being recruited, I would suggest emphasis on what

the graduate program can do for the student. Some institutions like to talk about their tradition of excellence, their international reputation, and the fame of their faculty. These may be matters of which they are deservedly proud, but the prospective student will want to know how those matters will benefit her or him. Students undertake graduate study, after all, not to assist the institution and add to its fame, but rather to advance their own intellectual growth and professional development. Tell them how the institution can help them if you want to interest them in your program.

Once a prospective graduate student is persuaded to apply for admission, that application should be handled carefully and promptly. If, as is most often the case, an application is sent to the department for evaluation and a recommendation of admission, that application should be monitored by the graduate school office to assure that it does not get lost on some faculty member's desk, or in some departmental file. We should always keep in mind that the strongest applicants are most likely to be accepted, and offered fellowships, at other institutions. If we are slow in responding to applicants, we are selecting our graduate students negatively. When we handle applications carelessly, we are assuring that our best applicants will go elsewhere.

All through the recruiting process, we should keep firmly in mind that we have ethical obligations to the students we are recruiting. It can be easy to get so wrapped up in the effort to attract numbers (and show what good recruiters we are), that we encourage students who should not come to our institution. We should be careful not to attract students for whom we do not have the right program. We should not encourage applications that are likely to be denied, just to add to our rejection numbers and show how "selective" we are. Surely there are other ways to demonstrate excellence than by counting how many times we say no.

We should be careful to avoid admitting students who are not likely to succeed on our campus. If we cannot meet a student's needs, or if a student is not likely to meet our academic standards, we should counsel that student to apply elsewhere. Bringing a student to campus only to be frustrated, disappointed, or unsuccessful is not good recruiting.

Finally, we must remember that retention is the other side of the recruiting coin. Once we get students to our campus, we should make every effort to help them succeed. I have heard academics cite their institution's high failure rate as an indicator of their high standards. This, I admit, is irresponsible nonsense. If large proportions of your graduate students are failing to complete their programs—either by academic failure or by dropping out or by excessive delay—your institution is guilty either of poor teaching or of poor admissions evaluation. If we are to recruit students actively to our graduate programs, we are assuming an obligation to those students, a commitment to provide the best possible educational experience, and the best possible opportunity to succeed.

COMMENTS ON THE RECRUITMENT OF GRADUATE STUDENTS

Thomas P. Hogan

Let me begin my remarks by expressing appreciation to Peterson's Guides and to Mr. Dickason for the research they have conducted on the topic of recruiting graduate students, and for sharing that information with us here today. Mr. Dickason's analyses have provided useful insights into the recruiting process. For those of us who have labored in the vineyard of graduate school recruiting for some time, many of the results simply confirm what we have already learned through our own experience. Other of his results yield new insights. However, even for those results which do not seem new, it is very useful to have the work confirmed in a formal study—even if for no reason other than to illustrate to our supervisors that we are not out in left field.

Any recruiting effort must be devised and undertaken in the context of a particular institution, with its own peculiarities, history, goals, etc. Hence, before passing on my own comments on recruiting graduate students, I should outline, just briefly, some of the important characteristics of the institution I serve.

The University of Scranton is a private, Jesuit-related, master's-only institution, with a total enrollment of approximately 5,000 students. There are 17 master's degrees programs offered. The institution is economically healthy, with the undergraduate day school enrollment "capped" at about 3,500 students. However, the institution has an interest in seeing growth in numbers at the graduate school level, following a period of decline for about ten years. And, in fact, the decline has been reversed; we are now experiencing an annual growth rate of about 5% in graduate enrollments. In terms of some of the important characteristics identified by Mr. Dickason: yes, we do have a formal marketing plan. Yes, we do have a specific budget for marketing. And yes, we do have a tracking system for inquiries. All of these have been instituted in the past two years.

With that background in mind, let me try to formulate some thoughts or suggestions aimed particularly at master's only institutions which might wish to increase their graduate enrollments.

First, any effort to increase graduate enrollments or to implement a marketing plan should be accompanied by a program to *improve quality* and stiffen admissions standards. Of course, everyone is interested in quality for its own sake. But, it is especially important to couple increased marketing with an emphasis on quality because there is a perception on the part of many people in higher education that if you engage in an aggressive marketing effort you are going to sacrifice quality: lowering your standards, admitting marginally qualified students, bending rules, etc. The most effective way to counteract this feeling is to increase standards at the same time as a marketing effort is introduced. And, in fact, experience shows that it is

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not only possible, but almost inevitable that an increased emphasis on quality, including increased rigor in admissions standards, will aid rather than hinder the recruiting process.

Second, although one typically thinks of marketing in the context of existing programs, the importance of *new program development* or the complete overhaul of existing programs can hardly be overemphasized in a comprehensive marketing plan. Most growth in numbers will come from the introduction of new programs rather than growth in old, existing programs. Of course, new program development calls for a type of involvement in the institution very different from the involvement needed to market existing programs.

Third, one must be aware that a vigorous, sustained recruiting effort—incorporating many of the features outlined by Mr. Dickason—will result in a tremendous *increase in paperwork*. A 10% increase in enrollment does not come from a 10% increase in marketing-related paperwork: the relationship is more like an exponential one. Even modest enrollment gains take a great increase in printings, mailings, computer runs of this, that, and the other sort. From a practical point of view, what this means is that, if you are going to undertake a serious marketing effort, you had better have some very good friends in your computer center and print shop, and money to buy their services.

Finally, I would like to suggest that it is a very good idea for local institutions to share ideas about marketing at the graduate school level, as we are doing here today, and to do so without the fear that the other guy/gal will learn our secrets. I say this because of my belief that, at least at the graduate school level, our greatest competitors are not other institutions. Rather, our greatest competitor is the idea of "not going to graduate school at all." And the two cornerstones of this idea are (a) simple lack of energy and (b) a feeling that it is probably not worth it, on the part of prospective, well-qualified applicants. In combating these feelings, we can work together rather than against one another to our mutual benefit.

RECRUITING OF GRADUATE STUDENTS AT NEW MEXICO STATE UNIVERSITY

William H. Matchett

Recruiting efforts at New Mexico State University occur at various levels in our organization. The most effective means of recruiting students involve the department and individual members of the faculty. The best students will be aware of the work of distinguished faculty and they will make contact accordingly. We encourage this type of contact and we subsidize it to the extent our budget will allow. Encouragement takes several forms. We support faculty travel to interview students, telephonic or telegraphic com-

munication, and in some cases, travel of prospective students to permit on-campus interviews.

Most of our departments utilize brochures or placards with inquiry cards that can be used by the prospective student to obtain information. Many of our departments have a program for systematically visiting institutions from which they have obtained successful students in the past. These visits result in formation of an informal network of "feeder departments."

We have found other activities useful:

1. Take advantage of geographic location to attract students.
   a. Culture
   b. Geology
   c. Climate
   d. Relationship to cities
2. We have streamlined our admission procedures to eliminate the apparent "red tape."
   a. Computer-generated letters
   b. Timely notification to the departments of status of applications of prospective students
3. We provide an orientation for incoming graduate students.
   a. Parts of 2 days are used for information sessions on various central facilities (e.g. library, computer)
   b. Sessions on general responsibilities of graduate assistants (these complement departmental efforts)
   c. Two social occasions to which new students and faculty are invited
   d. Handbooks for teaching assistants
4. We are represented at GRE forums.
5. We have special programs for minority students.
   a. Coordinate with ethnic directors
   b. Designated assistantships
   c. GEM conferences
6. We speak to upper division classes in the professional schools of the university on the importance of graduate training as a part of career development.
7. We pursue opportunities in the off-campus environment to provide graduate training and degree programs. At the present time about 7% of our enrollment consists of students in off-campus programs.

6. NON-FACULTY UNIVERSITY RESEARCHERS AND GRADUATE PROGRAMS

Presiding: X. J. Musacchia, *Associate University Provost for Research and Dean of Graduate School, University of Louisville*

Speaker: Robert Bock, *Dean of the Graduate School, University of Wisconsin-Madison*

Robert Bock

The Current Scene and Recent Events

The current highly competitive grant process leads to instability (and insecurity) for researchers supported on individual investigator awards. Recent years average 30-40% approval rate on all applications, in 90% of all support sources.

NSF Science and Technology Centers, Engineering Research, and DOD University Research Initiative Programs plus an effort to lengthen grants to a 3-year average have opened areas of more stable employment for non-faculty researchers.

At the same time, NIH has disassembled many Program Project Grants (5-year duration and orderly renewal), emphasized RO1 but increased average grant length (~10% are now of 5-7 year duration). Clinical Research Centers, Primate Centers, Mental Retardation Research Centers, Howard Hughes Institutes, and emerging Human Genome, Aids Research Centers all use more non-faculty researchers but are relatively stable.

Pressures to contain indirect costs have capped or reduced University ability to budget doctoral research support staff except on direct costs. Health care cost control measures are inhibiting use of medical center income to support research and the research infra-structure.

The Need for Security and Career Ladders

Fringe benefits cover lay-offs in an unproductive way. The fringe tax on research funding doesn't get spent on research. There are few legal ways to stabilize research at the university level (tuition and patient care income policy, unrelated business restraint all inhibit use of income in positive manner). Alumni, foundations, industry are *not* sympathetic to the need to stabilize employment of research staff.

Personnel Policies

Performance-based review and promotion is needed to create a quality career ladder. Defined levels of notice and job security from 6 months, one

year, rolling two-year and finally indefinite status (last person to go of non-faculty academic staff) are in place at some but not all institutions.

We need clear standards, comparable practice and review throughout the institution (maybe in the long term future, we can hope for comparable standards in major research universities). If research is a minor activity (less than 10% of fiscal activity in a university) then ±20% fluctuations can be handled with reasonable ease. When research is 30 to 60% of a university's activity, the ±20% fluctuations often encountered in research support can create a true fiscal crisis and rock the whole university. We have intentionally avoided major facilities and programs (any one program which could become more than 5% of our research budget for example, an annual level of support from a single source in excess of $10 million). Diversity makes stability possible!

Areas where Ph.D. level skills are critical to competitive performance are often staffed with non-faculty Ph.D.s. Advanced application software where expertise in discipline is essential, NMR, Molecular Modeling and design, data interpretation are examples of such areas. Computing is no longer the limitation on progress but application to field-specific problems is where the action lies. Broad basic competence in material science (physics, chemistry and engineering interface), neuroscience, immunology, genetic engineering are areas where Ph.D. non-faculty researchers are found in significant numbers.

Demands of rapidly moving, highly competitive fields are such that either faculty need support personnel plus light teaching load or there must be non-faculty researchers to enhance the program.

The Academic Role of Faculty and Non-Faculty

Review, tenure and standards for faculty are demanding screens. In return, they govern the academic and research direction of the university. In many settings, law assures the academic decision rights of the faculty.

Non-faculty experts can be valued resources to enhance training quality. But turning over the academic authority without appropriate control and review is dangerous and in certain settings illegal.

In the non-faculty doctoral research staff, one finds a large population engaged in advanced training in the form of full-time research apprenticeships. These postdoctoral fellows, postdoctoral trainees and research associates are best served if the temporary nature of their service is explicit in their appointment. Three years is a reasonable limit, with justified need for continued training stated by both trainee and trainer in any petition for extension. A one-year extension should be a limit with a required move to a career employee track for any additional period. In the past decade, the postdoctoral staff in temporary training has ranged from 400 to 700 at University of Wisconsin-Madison. The National Research Service Award is the single largest source of support for the category.

A second temporary group who are apprentices in medical service and in medical student teaching are the interns and residents. Because of loan repayment policy, both these categories may wish to be students, receive academic credits and pay modest tuition in accord with their continued training status.

Research staff who are on a career track may be called Researchers, Scientists and in some institutions, non-tenure track Research Professors. A career track with clearly described titles, review mechanisms and promotions in salary, title, job security and authority in the research unit is needed. As members of the academic staff, these persons may have voting authority in governance matters appropriate to their role and may be represented by an association, union or other governance structure.

A significant population of researchers at leading universities are not employees of the university but are guest Visiting Scientists or Visiting Professors paid by their employer or home government and are present for a specified period to accomplish a particular research mission. At UW-Madison such visitors are one-tenth as numerous as our faculty in the 1980s.

A summary of these 1,000 doctoral trained, non-faculty researchers this year at UW-Madison is as follows: 488 Fellows, Trainees and Research Associates (3-year limit), 265 Researcher track (full-time, advanced trainee career employees) and 96, 105 and 58 Assistant, Associate and Senoir Scientists (faculty parallel, half are postdocs). What does the future hold?

The demography of faculty age, size of the doctoral research training pipeline and size of the student age cohort suggest that there will be increased likelihood that a Ph.D. will find a faculty position. Biotechnology and high technology application to the commercial sector is making career opportunity in industry highly attractive compared with non-faculty research careers in a university. It does not appear likely that the rapid growth of the non-faculty doctoral researcher pool of the 1970s and early 1980s will continue into the 1990s. Stability or reduction in this cohort relative to faculty numbers is more likely. A prolonged depression could lead to growth in non-faculty researchers as it did in the Great Depression. Then the staff expanded without a growth of resources. The competition of foreign nationals for these positions is great but immigration policy can block this flow, as we have recently experienced.

In determining the role non-faculty research staff play in academic affairs such as supervising graduate students, passing or failing students, deciding on curriculum and voting on department/college allocation of space, resources and academic priorities, there can be a serious struggle for power with unfortunate consequences. Wisconsin law gives academic governance to the faculty but assures student and employee participation with authority on matters primarily of concern to those groups. There have been incidents where concern for job security has led individuals to seek support for activity not appropriate to the university mission or even in conflict with university non-profit tax status; we can probably all identify cases

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where low student interest has led to admission practices not in accord with long term goals. Individual faculty as well as non-faculty priorities may be in conflict with university priorities.

We have struggled for over a decade to find the proper balance of rights and authority. We will attempt to continue to work in good faith to find constructive solutions. Fortunately, we have not experienced the paralysis of research which beset French laboratories during a struggle for authority there, but it is a danger made greater both by distributing authority without responsibility and by refusing to recognize the rights and contributions of all members of the academic community.

In a year-long study, with debate at college, department and center level and discussions at the Faculty Senate and major governance committees, there were sharply divided opinions of the wisdom of extending faculty-like responsibility and authority without the binding review of our tenure process. The integrity of the tenure process was seen as undermined by giving faculty roles to non-faculty. The integrity of the academic mission was thought to be endangered by expanded authority to persons not bearing full faculty rights and responsibility.

The survey found overwhelming objection to delegation of traditional faculty responsibility to persons not on the tenure track and subject to scheduled full review of scholarly performance including teaching, research and public service.

Luncheon

Thursday, December 3, 1987

PRESENTATION OF AWARDS

GUSTAVE O. ARLT AWARD IN THE HUMANITIES

Presented by: Gillian Lindt, *Chairman of the Arlt Award Committee and Dean, Graduate School of Arts and Sciences, Columbia University*

Dr. Vera Kutzinski (r.) is holding the award presented to her by Dr. Gillian Lindt, Chair of the Arlt Award Committee.

The Gustave O. Arlt Award in the Humanities was presented to Dr. Vera M. Kutzinski in recognition of her book entitled *Against the American Grain: Myth and History in William Carlos Williams, Jay Wright, and Nicolas Guillen* published by The Johns Hopkins University Press in 1987. Dr. Kutzinski is Assistant Professor of English, Afro-American Studies and American Studies at Yale University. The Arlt Award in the Humanities is given to a young scholar teaching in the humanities at an American university who has earned the doctorate within the past five years and published a book deemed to be of outstanding scholarly significance. This year the field of competition was English-American Literature. The award is named in honor of the late Dr. Gustave O. Arlt, a distinguished humanist, and first president of the Council of Graduate Schools.

CGS/UNIVERSITY MICROFILMS INTERNATIONAL DISTINGUISHED DISSERTATION AWARD

Presented by: William Johnson, *Chairman of the Dissertation Award Committee and Dean of the Graduate School, University of North Dakota*

Dr. Jerome Pollitt, Dean of the Graduate School at Yale University is shown holding the award accepted by him for Dr. Greengard in his absence. Also in the photo are Dr. A. William Johnson (r.), Chairman of the CGS/UMI Dissertation Award Committee, and from University Microfilms International's Dissertation Information Services Award Committee, John Riedel, Senior Vice President and Bonnie Maxwell, Manager of Operations.

Winner of the CGS/UMI Distinguished Dissertation Award was Dr. Leslie F. Greengard, Postdoctoral Fellow and Associate Research Scientist in the Department of Computer Science at Yale University. He received the award in recognition of his dissertation entitled: *The Rapid Evaluation of Potential Fields in Particle Systems.* The broad field of competition for 1987 was "Mathematical and Physical Sciences." The award was accepted for Dr. Greengard in his absence by Dr. Jerome Pollitt, Dean of the Graduate School at Yale University.

Each of the awards includes a suitably inscribed certificate and a $1,000 honorarium.

Plenary Session V

Thursday, December 3, 1987, 2:00 p.m.

DATA NEEDS AND GRADUATE EDUCATION POLICY

Presiding: Peter D. Syverson, *CGS Director of Information Services*

Speaker: Daryl E. Chubin, *Project Director, Office of Technology Assessment*

OTA, DATA, AND GRADUATE EDUCATION POLICY

Daryl E. Chubin

Today I have a dual role here: as a small symbol of the concern of the legislative branch for the future of higher education in the United States, especially the education of scientists and engineers, and as a consumer and evaluator of information that can be used to design and implement education policy. First, I shall tell you briefly about the Office of Technology Assessment (OTA), and then about a two-year project in progress and what it has taught us about data availability, analysis, uses, and needs. But I won't show you any data!

OTA: The Agency and A Current Project

The Office of Technology Assessment is the quietest and smallest one of four congressional support agencies. You've probably heard of the other three: the Congressional Budget Office, Congressional Research Service (of the Library of Congress), and the General Accounting Office. The purpose of OTA is to do policy analysis: to learn about, then define options for congressional action on a range of science and technology issues. A bipartisan board approves final assessment reports that emanate from nine different programs in the agency: Energy and Materials; Industry, Technology and Employment; International Security and Commerce; Biological Applications; Food and Renewable Resources; Health; Communications and Information Technologies; Oceans and Environment; and Science, Education and Transportation. Assessments last 18-24 months; some have immediate legislative utility; many, however, are anticipatory—they give context and history, revealing the spectrum of stakeholders and opinions, as well as possible future actions. OTA reports are seen, for the most part, as providing balanced, nonpartisan analysis.

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The assessment I have been directing, and Peter Syverson has been serving as a member of its Advisory Panel, is on "Education and Employment of Scientists and Engineers." It was requested by the Committee on Science and Technology of the U.S. House of Representatives in April 1986. The final report will be published in March 1988. I need not remind this audience that education has become a hot national issue. The 100th Congress is feeling and generating some of that heat. Everyone laments the state of education, particularly at the precollege level, but few know what to do or how. With cries of "competitiveness" echoing in our ears, and despite lamentations about the sorry state of facilities and equipment on college and university campuses, educating *people* especially research scientists and engineers, is cited by many as the number one priority. The OTA project is examining the reality behind this rhetoric, particularly the role of the federal government in helping to attract and sustain students in their pursuit of careers in science and engineering.

Data Sources and Data Needs

OTA acquires information through workshops and briefings, small data-collection efforts, and outside contractors. The policy analysis is done in-house. As part of the current project, we held three workshops, four briefings, conducted two mail surveys, and let a dozen contracts in trying to understand the process of formal education from K-12 through graduate school. Alert to demographic trends and Harold Hodgkinson's notion of educational stages forming "all one system," we traced the flows through the so-called science and engineering pipeline. I'd like to highlight some of what we've learned.

In one workshop featuring participants from the federal agencies and professional organizations that monitor enrollment, degree, and employment trends, the following *data needs* emerged:

- longitudinal data on science and engineering students—pre- and post-degree
- better leading indicators of demand: we focus on supply because we can't predict demand (even though the general health of the economy and R&D expenditures are known to be critical ingredients)
- information on graduate student support and its relationship to science and engineering supply: what is the typical form and level of a student's funding history?

A year ago, we fielded a national survey of 250 department heads in 20 science and engineering fields to develop perceptions of the job market for their graduates—at all degree levels—relative to developments at their local institutions and *what the federal government can and should do.* Most called for:

- more and steady support for graduate students, especially fellowships

and traineeships
- recognition that industry is siphoning prospective graduate school talent
- incentives for U.S. students, both the traditional pool of white males and those traditionally underrepresented—women and non-Asian minorities—to enter science and engineering.

These recommendations make essentially the same point: money talks and the federal government should do the talking! Actually, the federal role in immigration policy may be more critical for the supply of scientists and engineers. Foreign students are of high quality and are keeping many graduate departments in business. On average, half of these students secure permanent visas and stay in the U.S.; the rest return home. Is this a brain drain, a loss of talent to our economic competitors, American altruism, the key to staffing U.S. engineering faculties, or what? We have heard all these interpretations.

This year we awarded four data-based contracts to illuminate the selective tail-end stage of the pipeline, higher education. The rationale was to *utilize existing databases to link student intentions with enrollments, degrees, and entry-level careers.* We asked:

- how different are science and engineering-intending high school students from students pursuing other fields?
- what undergraduate institutions seem to be most productive of students who go on to earn Ph.D.s in science and engineering?
- how do debt and financial assistance affect decisions to pursue and persist to a graduate degree?

Briefly, we have learned from these contractors that:

- There is a core group of students well-prepared in science and math who continue to enter science and engineering fields, though undergraduate computer science and engineering enrollments are down from three years ago. A larger fraction of the high talent students are now attracted to business as a major, though science and engineering majors are still dominated by such high-talent students.
- On a per capita basis, the research colleges (Oberlin 50) send more students on to graduate science and engineering programs, though in absolute numbers the research universities are the major feeder institutions. The historically black colleges and universities (HBCUs) and the traditionally women's colleges provide the social and intellectual support for their respective populations better than other environments (though there are notable public campus exceptions, e.g., the California State System).
- Incurred debt removes students, especially minority students, from the undergraduate segment of the pipeline. Curtailment of fellowship, RA, or TA support feeds attrition, especially among women, before completion of the Ph.D.

Lessons Learned and Policy Messages

In assimilating the findings from these various analyses, I have been struck by the discontinuity of databases. NSF and NRC, for example, have collected data on students in higher education for 30 years; still, we have progressed little beyond numbers in-number out at each successive stage. We lack the perspective of students moving through the pipeline. More than surveys are needed. Institutions devote countless resources to their undergraduate admissions processes and formulas for predicting freshman GPAs and won't document their failures, i.e., why do students drop out or transfer? Exit interviews would help. Such information has both a diagnostic and a planning function. It helps devise recruitment strategies and retention models to reduce the waste of talent. With a downturn in the number of available students, and more importantly, a greater minority composition of that student pool, recruitment and retention are the keys to the future. The well-prepared core group will not be enough. Community colleges, too, which nobody wants to study or support, will play a bigger role.

As graduate educators and administrators, you must rethink the pipeline as something more than a filtering and constricting device that reduces your intake to a trickle and your output to 50-80 percent—estimates vary by source and field--of those who undertake study for the Ph.D. The pipeline should be permeable membrane that allows migration *into* science and engineering as well as leakage out. This, in turn, requires new ways of identifying talent building on interest in things scientific and technological, and improving preparation to continue to degree-taking in science and engineering fields. The image of science in our culture must change from that of a privileged preserve for a few extraordinary people to a creative enterprise that taps a range of skills and talents. The elitism of graduate education is itself a barrier to contributing its expertise to institutions in earlier stages of the educational process, whether the contributions are guest lectures and hands-on demonstrations at local public schools or participation in the reform of how calculus is taught.

Finally, aside from cultural upheavals such as war and the draft, and legislation such as Title IX of the Education Amendments of 1972, the greatest advertisement for graduate education is the health of universities and the attractiveness of the academic career. Graduate schools are today competing for talent with industry, business, and the military, as well as professional schools. Remember, annual Ph.D. production in science and engineering does not track the size of the birth cohort or the number of baccalaureate degrees awarded seven years earlier. There's something else going on.

My advice to you is the same as my advice to Congress: invest in students to assure their educational achievement. Give them more than the opportunity to succeed. Reward programs that produce success and try to reproduce them (especially those outside your home institution and those that do

not fall neatly into disciplinary niches). In other words, marshal and direct resources. While in transition to the steady state, universities can't do everything they used to—or do them equally well. That in part is what partnerships with state government and local industry are all bout. The federal role may be more symbolic, and thus catalytic, than anything else.

Conclusions

And for data scavengers like OTA, I urge you to keep systematic records that can become new databases or be integrated with existing data sources to help clarify the national picture of where graduate students—disaggregated by field, gender, race and ethnicity—come from and where they go after departing your institutions. We in the congressional branch are part of your community of interest, specializing in the translation of knowledge into policy. You, however, must ultimately make policies work for you in practice. As consumers and evaluators of data and scholarship, therefore, we are your allies. At OTA, we relish hearing from allies and critics alike; indeed they are often one and the same.

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MORE PLENARY SESSION SPEAKERS

Congressman Fortney (Pete) Stark (D-CA)

Judith Swazey
President
The Acadia Institute

Robert Bock
Dean of the Graduate School
University of Wisconsin-Madison

Barbara Mishkin
Associate
Hogan and Hartson

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Plenary Session VII

Friday, December 4, 1987, 9:00 a.m.

INTERDISCIPLINARY PROGRAMS, CENTERS AND INSTITUTES: ACADEMIC AND ADMINISTRATIVE ISSUES

Presiding: Kenneth Hoving, *Dean and Vice Provost for Research Administration, University of Oklahoma*

Speakers: Donald Kash, *George Lynn Cross Research Professor, University of Oklahoma*
Richard Attiyeh, *Dean of Graduate Studies and Research, University of California, San Diego*

INTELLECTUAL NEED VERSUS INSTITUTIONAL RESISTANCE: INTERDISCIPLINARY CENTERS

Donald Kash

In the late 1980s the graduate dean occupies an exciting and inherently troubled position in the university. Institutionally, the graduate dean has primary responsibility for the maintenance and enhancement of those Siamese twins, research and graduate education. Commonly, she or he also looks after the acquisition and management of external research monies which support most of the research in the natural sciences and engineering. So long as most research was carried out within the traditional disciplines, the graduate dean's activities squared with the interests of the departments and other colleges. It was a warm fuzzy world for all involved.

That world is changing. The traditional organizational structure of the university is increasingly incompatible with that substantial portion of frontier research which requires interdisciplinary groups or teams. I speculate that when future intellectual historians review the 1980s they will see it as the beginning of the end of an era, a period in which the pattern of scientific research as it has been practiced for the last 250 years began rapidly to change.

Modern science has been predominantly reductionist. Understanding has been obtained by division and subdivision. The organizational structure of the university followed the development of intellectual structures. Thus, the pattern was for the university to create a department after an integrated body of learning had been developed which could be separated from what preceded it. Understanding preceded organization.

Graduate deans are now faced with promoting and developing organizations to *create* knowledge. The fundamental character of the university is changing. It is necessary to create organizations in advance of understanding.

The pressures which are leading to this reversal in the evolutionary pattern of the university are two-fold. On the one hand, a growing number of distinguished scientists and engineers argue that the exciting intellectual frontiers require establishing teams of people with different disciplinary backgrounds. In some instances this is necessary because of big research equipment. In others it's because the conceptualizations, data bases, and skills that come from different disciplines are necessary to gain understanding or solve problems.

In part in response to these perceptions of the need for an interdisciplinary capability to increase knowledge and in part for applied reasons, federal agencies are putting more and more emphasis on interdisciplinary research. Examples are the NSF engineering research centers and science-technology centers and the Department of Defense's university research initiatives program.

Universities are creating interdisciplinary research organizations at a striking rate. In an effort to gain some picture of what is going on, Ken Hoving was willing to send out a questionnaire aimed at getting a count of how many interdisciplinary research units exist at American universities and how many have been created in the last five years. The questionnaire went to the 100 universities receiving the largest portion of federal R&D funding. We received 47 usable replies. On the 47 campuses there are 1,127 interdisciplinary research units. Of those, roughly 30 percent or 341 have been created within the last five years. There is a growing tendency to create interdisciplinary research units.

Problems and Opportunities

I now want to talk about the problems and opportunities that revolve around interdisciplinary research centers beginning with federal funding. The Reagan administration's request and the Congress' willingness to provide additional money for interdisciplinary research in the NSF's and other agency budgets is linked to a perception of socio-economic payoff. The most important perception is that interdisciplinary research will be translatable into products and processes which will make the U.S. more competitive. The assumption is that the invisible hand of the market will move university-based interdisciplinary research into competitive products and processes. I think the evidence is overwhelming that that won't occur on a broad basis. When it doesn't occur, there's going to be some unhappiness. Let me state it specifically. I think the arguments that have been made for new money for interdisciplinary research have involved overselling the

competitiveness payoff.

There is an additional danger. Our ability as academics to clothe what we want to do and what we've traditionally done in whatever budgetary clothes are selling is well established. If the universeities take this interdisciplinary research money and convert it into traditional project grants—that is if the engineering research centers and the science-technology centers become mini-NSFs on individual campuses—then when the time for review comes, the universities are going to be dealt with harshly. I want to emphasize that the time for review will come because the nation cannot get out of its present economic box without substantial disruption.

The Campus Context

Now some comments about interdisciplinary research on campus. The graduate research university, invented in Germany and refined in the United States, has been an incredibly creative institution. That may no longer be the case. If it is true that the frontiers of knowledge require interdisciplinary investigations, the university holds out the prospect of being an albatross hung around the neck of research. Interdisciplinary research organizations are created as mechanisms to carry out research tasks which would be better done by integrative conceptual systems or theories. Put in the simplest terms, in the absence of integrating concepts or theories but faced with questions which require utilizing the conceptual systems and information of different disciplines, the answer is to deal with the problem organizationally. Information exchange and idea generation occur not through theoretical structures, but by having offices and laboratories and coffee rooms which link people with different disciplinary backgrounds.

Accomplishing fruitful work with peole from different disciplines is difficult. The further those disciplines are apart, the more difficult it becomes. Linking a physical chemist and a physicist or a chemist and a chemical engineer is easier than it is to link a physicist with a political scientist.

The general experience suggests that establishing interdisciplinary organizations in universities is analogous to implanting a foreign organ in a body. The minute it is implanted, systemic rejection mechanisms are engaged. The critical role of the graduate dean is that of the medicine man who provides the daily injection of immunosuppressants needed to keep the university from rejecting the interdisciplinary organization.

The reasons universities reject interdisciplinary organizations are clear. Most fundamental is that work done outside the disciplines operates in a realm where there are no consensus quality standards. If the work isn't publishable in the respected journals of the disciplines, how do you know whether it's any good? The automatic instinct of academics is that it's not quality work.

There is a substantial body of experience conveyed by the faculty rumor

network which suggests that people who do interdisciplinary research are like university administrators: they aren't competent to do good research. In truth, the anecdotal evidence suggests that interdisciplinary research activities are magnets to charlatans and marginally competent people. They are also magnets to the most creative and the most competent people. Laid out on a quality scale, then, interdisciplinary research tends to be bi-polar in terms of the quality of the people involved.

Given the lack of consensus standards for measuring interdisciplinary research and the existence of such standards within the disciplines, the organizational forms and procedures of the university become very important. Success or failure in universities is generally controlled through departmental tenure and promotion decisions. Anyone who gets involved in interdisciplinary research prior to tenure or becoming a full professor runs a very high risk. This tends to be the case even when specific commitments are made when people are hired.

Departments are organizational units held together by a common intellectual focus. They tend to have shaky organizational memories. In a world where academic administration has become a profession, those who practice it are generally interested in climbing the ladder—that is, going to bigger and better jobs and bigger and better institutions. It's hard to write a contract to protect people involved in interdisciplinary research. This appears to be the case even if there's no active opposition. In truth, however, there's frequently very active opposition because the departments and the colleges view the world at any point in time as a place with finite resources. If some of those resources go to an interdisciplinary unit, that means they are being taken away from the existing departments and colleges.

I've had the opportunity to chair a National Research Council committee which seeks to provide advice to the National Science Foundation's Engineering Research Center Program. It's been a particularly rewarding and interesting experience, but I've come away from it with one very clear sense. It is that anything that's new and different is viewed by the academic establishment as dangerous and doubtful. Over any period of time the capacity of the academic research community to attack and erode interdisciplinary research programs is, I think, quite impressive.

How to Deal With a Mongrel?

Following the above thoughts, how should universities deal with the growing development of interdisciplinary research units? One common argument is that researchers ought to wait to get involved until after they have proven themselves in their discipline and received tenure or perhaps even promotion to full professor. Over the years I've told a number of assistant professors that that is the only safe route to take.

There's a gnawing question here, however. In a number of areas the

evidence indicates that really important breakthroughs come from young people. Certainly that seems to be the case in mathematics and physics and in some areas of chemistry and molecular biology. More broadly, it is part of conventional wisdom within the scientific-technical community that R&D is a young person's game. If the most important research questions or at least some substantial portion of them are interdisciplinary in character, waiting until people have become academically long of tooth before they address such problems means we're probably slowing progress in science and technology. If young people in universities can't afford to get involved in interdisciplinary research, then interdisciplinary research tends to be carried out by those of us who are getting gray and whose gray matter is slowing down. That may be an unduly high cost for society to pay.

From the point of view of the graduate dean wanting to make an interdisciplinary research unit work, what should you do and what should you look for? My formula was given to Herb Hollomon who was the president of the University of Oklahoma at the time I went there. I told him that an interdisciplinary research unit needed hard money funding. In general, you shouldn't create interdisciplinary units using soft money. The reasons are several. Obviously, hard money gives the unit predictability and a capability to plan and carry out programs. But the hard money is also symbolically terribly important because it communicates to the departments and the rest of the university that this mongrel unit is going to be there. It's important to internal politics.

Second, nothing is more important than common space. Basically, what you're doing in an interdisciplinary research unit is substituting organization and common physical location for a common intellectual structure. Interdisciplinary research units which try to operate by having an hour's meeting a week are formulas for failure.

Third, interdisciplinary research units need a leader. It has to be a person who's willing to put up with keeping the Visigoths in the disciplines on the other side of the Rubicon, who can provide reassurance for the inherently insecure faculty involved in interdisciplinary research, who can hustle the administration, and who can provide intellectual leadership. That's a fairly tough formula. You ought not to bother if there isn't somebody of that kind around. Once an interdisciplinary research program has been launched and is underway, such a leader may not be so critical.

Four, during the initial launching period, the president of the institution and the graduate dean and various other people need to, on a random basis, say, "Boy, have we got a creative breakthrough new activity going on over in interdisciplinary research unit X. That outfit is at the frontiers of knowledge. We're lucky to have those people involved." This serves two purposes. It reassures those who are involved, who will almost inevitably wonder what they're doing. It also dampens the tendency of the departments to attack.

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Finally, and perhaps of greatest importance, the interdisciplinary research unit must have primary responsibility and authority to evaluate the quality of research when it comes to making tenure and promotion decisions. Interdisciplinary research will at least in part not be publishable in the conventional disciplinary research outlets. For this reason it is of central importance that the evaluation of the research rest with the interdisciplinary center or unit. This requires that the university administration focus major attention on the evaluation process. That is, the evaluation clearly needs to be one which has input from people outside the institution who are interested in and concerned with work in the interdisciplinary area.

Let me conclude by repeating a couple of points. There's powerful evidence that substantial intellectual opportunities and social needs require a movement in the direction of interdisciplinary research organizations in universities. The university is organizationally and culturally a hostile environment. If universities don't find ways to deal with this inherent conflict, we will see larger and larger portions of research being moved into other institutions.

INTELLECTUAL NEED VERSUS INTELLECTUAL RESISTANCE: INTERDISCIPLINARY CENTERS

Richard Attiyeh

In his presentation on this subject, Donald Kash has provided an insightful analysis of what is a very real and interesting issue. Without doubt the development of interdisciplinary research and teaching programs is having and will continue to have a substantial impact on universities. The vitality and growth of fields such as nonlinear science, material science, cognitive science, biotechnology, and many others is substantial and important.

There also is no question that these developments require organizational adaptation that meets with considerable resistance. While interdisciplinary research receives a lot of nominal support, there is often reluctance to pay the price for establishing interdisciplinary research centers. I do not, however, agree with Don that we are not adapting rapidly enough. According to Ken Hoving's survey results, the typical research university has created seven interdisciplinary research centers in the past five years. That strikes me as very rapid response.

Judging by the experience on my own campus, there is also a good deal of change that takes place within traditional departments. In many cases, departments that are thought of as bastions of disciplinary conservatism are in fact interdisciplinary already and becoming more so. At UC-San Diego there must be a half-dozen departments where a significant amount of molecular genetics research takes place. Similar statements could be made

about other important areas of research, such as cognitive science, material science, and nonlinear science.

For several reasons spelled out below, I tend to think a good deal of the resistance to rapid organizational change is a good thing. First, as Don has pointed out, traditional disciplines have established well-defined standards of academic excellence. While these can be used to stifle innovation, their proper application does serve to preserve and promote faculty quality. These standards should not be abandoned or discounted too readily.

Second, as Don has also made clear, there is the risk that today's exciting new interdisciplinary center will be tomorrow's white elephant. When new directions are tried within a department they are easily aborted if they fail. This is not the case with free-standing centers, especially those with permanent, hard-money budgets. In this connection, again citing Ken Hoving's survey, the responding universities phased out on average 1.5 interdisciplinary centers during the past five years. That is more than I would have expected, but still not very many.

Third, there is a tendency for the creation of new interdisciplinary centers to erode the cohesiveness and strength of departments. Before we get too caught up in making lots of new centers, we need to consider the effects on successful departments of having key faculty shift their offices, laboratories, allegiance, and active participation away from those departments.

Fourth, centers do incur costs. They require more administrative support. More importantly, they require space. This is particularly burdensome if, as a means of ameloriating the impact on departments, we encourage "double dipping" by allowing participating faculty to have second offices and/or labs.

Fifth, in the past, centers have often become the individual fiefdoms of powerful faculty members who see them as their private preserves. In such cases, they fall short of serving the objective of bringing together faculty from several disciplines to work on problems of common interest.

Despite these concerns, I want to reiterate that I believe interdisciplinary centers are important and their development should be encouraged. My point is that we should proceed cautiously. What does this mean for the dean of graduate studies and research? First, our most important task is to try to identify those centers which will have an important and possibly lasting contribution and then support their development.

Second, before making a permanent commitment, provide a promising center with temporary core support and some seed money and give it a trial period, say three years. At UCSD, we have used the term "project" for nascent interdisciplinary centers. Those that succeed can become organized research units. Those that fail disappear.

Third, make sure that there is a well-defined graduate training function in any new center.

Fourth, maintain a rigorous program of formal, periodic review. At UCSD, the center and its director are reviewed every five years.

Fifth, make clear when ORUs are created that there are tough sunset pro-

visions. The burden of proof for continued support, indeed for continued existence, should be on the center.

In conclusion, I would like to cite a statistic that Clark Kerr has used on occasion. In Western civilization there are about 66 institutions that have had a continued existence since the Reformation. Four of these are the Catholic Church, the Lutheran Church, the Parliament of Iceland, and the Parliament of the Isle of Man. The remaining 62 are universities. The reason for the longevity of universities, aside from their intrinsic merit, is that they are rather conservative institutions, and they do adapt over the long run to changing needs and opportunities. Gradual change has worked well for universities in the past and such behavior will stand us in good stead in the present. We need to move in the direction Don would like us to—indeed I believe we have—but we need to move cautiously.

Business Meeting

Friday, December 4, 1987, 10:45 a.m.

Presiding: David S. Sparks, *Vice President for Academic Affairs, Graduate Studies and Research, University of Maryland*

Chairman's Report: David S. Sparks

President's Report: Jules B. LaPidus, *President, Council of Graduate Schools*

CHAIRMAN'S REPORT

David S. Sparks

Some years ago I began collecting aphorisms and find pleasure in applying them to current events or situations. During the course of these meetings, particularly during our discussions of our efforts to obtain increased government support of graduate education, I was reminded of the aphorism attributed to that famous author known as Anon which states that there are "three impossible professions: teaching, healing, and governing." On other occasions during the course of our discussions over the past two days here in Washington I was reminded of the Michigan law-maker who is credited with declaring that "there comes a time to put principle aside and do what is right." And throughout these annual meetings I have tried very hard to forget the sage advice of Will Rogers who observed "a conference is just an admission that you want somebody to join you in your troubles."

The Board of Directors of CGS met three times during the past year: April 15 in Washington; July 15 at the University of Wisconsin in Madison; and on December 1 in Washington.

The Board took particular satisfaction in the successful completion of two major items on the CGS agenda: the ratification by the membership of the proposed revisions in the Constitution of CGS and second, the successful completion of the second step of the dues increase previously adopted by the Board and the membership. The latter was achieved with no change in the total number of members.

Among the major issues addressed by your Board during the past year were federal tax and funding issues which, as Congressman Stark observed, we are better represented than we deserve, given our small stake in a trillion dollar budget. We also are pleased at the progress we have achieved in the further development of the CGS graduate education data base. We were particularly pleased with the *Annotated Bibliography on Graduate Education, 1980-1987* which Paul Jones, in his role as Resident Dean at CGS during the past year has completed for us. Copies have been forwarded to your offices. We have also been pleased with the continuing development of a major

study of the master's degree which has been reported to you.

The Board welcomed to its ranks three new members: Dean Kenneth L. Hoving of the University of Oklahoma, Dean Joyce V. Lawrence of Appalachian State University, and Dean Gene L. Woodruff of the University of Washington. Simultaneously the Board bid goodbye, with deep gratitude, to departing members Dean Albert W. Spruill of North Carolina Agricultural and Technical State University, and Dean Victoria A. Fromkin of the University of California at Los Angeles.

The Board also elected Dean C. W. Minkel of the University of Tennessee at Knoxville, Dean Charles U. Smith of Florida A & M University, and Dean Mary G. Powers of Fordham University to the Nominating Committee of the organization.

I know you will be pleased to learn that the Board has elected Dean Robert Holt of the University of Minnesota to the post of Chair-elect of the Council for the coming year. The Board also undertook steps to reorganize its committees and agenda to increase its focus on long-range planning. We are particularly concerned with anticipating the sea changes the 1990s will bring to graduate education.

In all of its work the Board is ably served by President Jules LaPidus, Dr. Thomas Linney, Mr. Peter Syverson, Ms. Edna Khalil, Ms. Evelyn Armitt, and Mr. Jerome Gray.

All of us have been particularly pleased with the success already achieved by the two current Deans in Residence at CGS, Dean Trevor Chandler of the University of Washington, and Dean George Marx of the University of Maryland, Eastern Shore. Please join me in an expression of appreciation to Jules, Thomas, Peter, Edna, Evelyn, Jerome, Trevor and George. It is clearly one of the best staffs in One Dupont Circle.

The summer workshop for new graduate deans is scheduled for July 10 through 15, 1988 at the Red Lion Inn Lloyd Center in Portland, Oregon. The 1988 annual meetings of the Council will take place at the Broadmoor Hotel in Colorado Springs, Colorado from November 29 through December 2, 1988.

It is now my very great pleasure to turn the gavel over to your Chairman for the coming year, Dean Vivian Vidoli, and I do so with the simple reminder that has been attributed to Albert Einstein: "Imagination is more important than knowledge."

I thank you for the opportunity to serve.

PRESIDENT'S REPORT

Jules B. LaPidus

As the year and this meeting draw to a close, it is useful, I think, to talk about some of the things that have happened during the year and some of our aspirations for the future.

First, let me report on some of our major activities during 1987. As I think all of you know, we have been very involved in trying to see to it that the tax treatment of graduate students, particulary TAs and RAs, is modified so that tuition remissions are not considered as part of taxable income. This has been a real roller coaster ride on a circular track, where with all the ups and downs, we keep coming back to the same position. We have had good support for that position, both in the House and Senate, and Thomas Linney, working with our tax counsel, John Jonas, has made sure that our position, that is, that tuition remissions in connection with TA and RA appointments should be excludable from income, was presented clearly and forcefully to the appropriate individuals. But the ambiguity in the law continues and we will continue to work during the coming year toward some permanent solution favorable to graduate education.

Our enrollment survey for this past year is beginning to take on the shape that will serve as a solid foundation for useful and continuing analysis of trends in graduate enrollments and degree production. The response rate to the 1986 enrollment survey was close to 90 percent, but it took a long period of time to get it that high. With a response rate like that, the report carries a good deal of weight. We hope to be able to duplicate that response in the 1987 survey, but because your experience and ours will be greater in 1987 than it was in 1986, we hope to have the report out to you much more quickly.

Our minority program continues to move ahead full steam. As you all know, Trevor Chandler from the University of Washington is with us this year as a dean in residence. We hope to conduct a series of meetings during the spring that will bring together small groups of graduate deans to discuss in depth some of the major issues of active minority participation in graduate education. There is little question that the minority presence in graduate education will continue to dominate the higher education agenda. Many groups are now working very hard, including the Patricia Rober's Harris directors, the Minority Graduate Education Committee of the Graduate Record Examination Board, ACE, and a variety of other groups. One of the crucial problems will be to work for some cooperation and coordination among these groups to get the maximum effect from this effort. CGS plans to provide information, ideas, and consultation to graduate deans that will enhance their ability to lead minority-related activities on their campuses. We will do this through the CGS Idea Exchange, through our publications, and through our relationship with other organizations working in this area. This is not a project for CGS, but rather part of the

ongoing agenda of the organization.

You have heard more at this meeting about our study of the master's degree and there is little left to add to that, except to say that we now need to find funds to support this massive study. Every institutional member of CGS is concerned with this degree and it is important that we try to improve our understanding of it, particularly with respect to our ability to articulate clearly what characteristics can be used to describe first-rate graduate education programs.

As you know, we are collaborating in a project to try to understand how ethical considerations and values are transmitted in the graduate education of scientists and engineers. We had a rather lively session on that subject on Thursday morning and it is clear that there is a great deal of interest among our members, not only in how graduate students learn about the ethics of scholarship and research, but about how we as administrators deal with the enormously complicated problems that can arise from allegations of fraud and misconduct in research. Part of our reason for carrying out the ethics and values project is to try to determine what our policies are and what our procedures are and how we go about defining these complex issues. We will be working on that through the next year.

Finally, you all know that our constitution was revised to permit Canadian universities to become members of the Council and we are pleased by the attendance at this meeting of five of our Canadian colleagues. Canada and the United States are two countries that have chosen to look at graduate education in about the same way, that is, to have organizations called graduate schools and have individuals called graduate deans who are responsible for the administration of those schools. We will be working hard to ensure close cooperation between CGS and the Canadian Association of Graduate schools, as we discuss issues of mutual interest.

This concludes the 27th annual meeting of CGS. It has been a good and productive year, made possible by your support and hard work. There is much to do ahead of us and we look forward to seeing you next year in Colorado Springs.

The Council of Graduate Schools
Financial Report for Years Ended September 31, 1987 and 1986

We have engaged Grant Thornton, nationally recognized certified public accountants, 1850 M Street, N.W., Washington, D.C. 20036 to perform a review in 1987 and 1986 of The Council of Graduate Schools. Summarized financial data is provided below. This recapitulation is not a complete presentation of the reports of Grant Thornton and does not contain all the data and informative disclosures required by generally accepted accounting principles.

BALANCE SHEETS

Assets	1987	1986
Current assets	$619,673	$602,785
Fixed assets, less accumulated depreciation	35,489	20,028
Endowment fund investments	18,012	18,012
	$673,174	$640,825
Liabilities and Fund Balances		
Current liabilities	$195,618	$197,205
Fund balances		
Unrestricted		
General operating fund	459,544	425,608
Restricted		
Endowment fund	18,012	18,012
Total fund balances	477,556	443,620
	$673,174	$640,825

STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND BALANCES

Revenue	$664,371	$641,405
Expenses		
Personnel	341,721	309,276
Research, meetings and travel	178,509	210,060
Office expenses	106,742	103,345
Gustave O. Arlt Award expense	3,463	2,190
	630,435	624,871
Excess of revenues over expenses	33,936	16,534
Fund balances at beginning of year	443,620	427,086
Fund balances at end of year	$477,556	$443,620

COUNCIL OF GRADUATE SCHOOLS

OFFICERS AND BOARD OF DIRECTORS
1987

David S. Sparks, Chairman, University of Maryland
Lee B. Jones, Past Chairman, University of Nebraska
Vivian A. Vidoli, Chair-Elect, California State University, Fresno
Victoria A. Fromkin, University of California, Los Angeles (1987)
Russell G. Hamilton, Vanderbilt University (1989)
Robert T. Holt, University of Minnesota (1987)
Catherine Lafarge, Bryn Mawr College (1989)
Gillian Lindt, Columbia University (1988)
William H. Macmillan, University of Alabama (1988)
X. J. Musacchia, University of Louisville (1989)
Albert W. Spruill, North Carolina A&T State University (1987)
Larry J. Williams, Eastern Illinois University (1988)
Jules B. LaPidus, Ex Officio, Council of Graduate Schools

EXECUTIVE COMMITTEE OF THE BOARD OF DIRECTORS

David S. Sparks, University of Maryland, Chairman
Robert T. Holt, University of Minnesota
Lee B. Jones, University of Nebraska
William Macmillan, University of Alabama
Vivian A. Vidoli, California State University, Fresno

REGIONAL AFFILIATE BOARD REPRESENTATIVES

Clara I. Adams, Morgan State University,
Northeastern Association of Graduate Schools
Margaret P. Gessaman, University of Nebraska at Omaha,
Midwestern Association of Graduate Schools
Carl D. Riggs, University of South Florida,
Conference of Southern Graduate Schools
Peter Suedfeld, University of British Columbia,
Western Association of Graduate schools

COMMITTEES - 1987

Gustave O. Arlt Award Committee

Gillian Lindt, Columbia University, Chair
Robert Carrubba, University of North Carolina at Charlotte
Catherine Lafarge, Bryn Mawr College
Richard Schwartz, Georgetown University

CGS/University Microfilms International Dissertation Award Committee Field for 1987 - Physical and Mathematical Sciences

William Johnson, University of North Dakota, Chairman
Anthony Barnard, University of Alabama at Birmingham
Margaret Gessaman, University of Nebraska at Omaha
Robert Lichter, State University of New York at Stony Brook
Bruce Pipes, Dartmouth College
Phillip Stiles, Brown University

Membership Committee

Eugene B. Piedmonte, University of Massachusetts, Chairman
Jeanne E. Gullahorn, State University of New York, Albany
Michael Malone, Montana State University
Averett S. Tombes, Wichita State University

Nominating Committee (1987)

Lee B. Jones, University of Nebraska, Chairman
Robert P. Guertin, Tufts University
Madelyn L. Lockhart, University of Florida
Albert Spruill, North Carolina A&T State University

Advisory Committee on Minorities in Graduate Education

John B. Turner, Masschusetts Institute of Technology, Chairman
Russell G. Hamilton, Vanderbilt University
Leslie S. Jacobson, Brooklyn College of CUNY
Clara Sue Kidwell, University of California, Berkeley
Leslie B. McLemore, Jackson State University
Deborah G. Thomas, Yale University
Leonard Valverde, University of Texas at Austin
Karen Y. Williams, University of Illinois at Chicago
Trevor L. Chandler, Ex Officio, Council of Graduate Schools

Planning Committee for the Study of the Master's Degree

Robert T. Holt, University of Minnesota, Chairman
Harry Andrist, Cleveland State University
Sister Anne L. Clark, College of Saint Rose
Russell G. Hamilton, Vanderbilt University
Lee B. Jones, University of Nebraska
Gillian Lindt, Columbia University
Donald S. Spencer, University of Montana
Albert W. Spruill, North Carolina A&T State University
Vivian A. Vidoli, California State University, Fresno
Kenneth C. Zimmerman, University of Minnesota

CGS/AAI Executive Deans Committee (AFGRAD)

Jules B. LaPidus, Council of Graduate Schools, Chair
Lyle D. Calvin, Oregon State University
John Dowling, University of Georgia
Robert E. Gordon, University of Notre Dame
Russell G. Hamilton, Jr., Vanderbilt University
Barbara C. Hansen, University of Maryland, Baltimore Graduate School
Lee B. Jones, University of Nebraska, Lincoln
George G. Karas, Iowa State University
Madelyn M. Lockhart, University of Florida
William H. Macmillan, University of Alabama
Allan G. Marr, University of California, Davis
C. W. Minkel, University of Tennessee at Knoxville
Ann M. Spearing, University of Vermont

REGIONAL ASSOCIATIONS OF GRADUATE SCHOOLS AFFILIATED WITH THE COUNCIL OF GRADUATE SCHOOLS

MIDWESTERN ASSOCIATION OF GRADUATE SCHOOLS

Executive Committee 1987

Margaret P. Gessaman, Chairman, University of Nebraska at Omaha
Suzanne Reid, Past-Chairman, Western Illinois University
Dean Jaros, Chairman-Elect, Colorado State University
George Karas, Member-at-Large, Iowa State University
Eric Rude, Secretary-Treasurer, University of Wisconsin-Madison

NORTHEASTERN ASSOCIATION OF GRADUATE SCHOOLS

Officers

Helen S. Cairns, President, Queens College of CUNY
Clara I. Adams, Past-President, Morgan State University
Howard B. Palmer, President-Elect, Pennsylvania State University
Vincent Rose, Secretary-Treasurer, University of Rhode Island
Richard B. Schwartz, Member-at-Large, Georgetown University
Ann B. Spearing, Member-at-Large, University of Vermont
Sister Anne L. Clark, Member-at-Large, The College of Saint Rose
Leslie D. Jacobsen, Member-at-Large, Brooklyn College, CUNY

CONFERENCE OF SOUTHERN GRADUATE SCHOOLS

Officers

Hazel J. Garrison, President, Hampton University
C. W. Minkel, Vice President, University of Knoxville, Tennessee
Arnold E. Schwartz, Secretary-Treasurer, Clemson University
Carl D. Riggs, Past-President, University of South Florida

Executive Committee

John K. Beadles, Arkansas State University
Herman F. Bostick, Howard University
Paul T. Bryant, Radford University
Gerald W. Esch, Wake Forest University
Virginia Falkenberg, Eastern Kentucky University
Lowell M. Greenbaum, Medical College of Georgia
Clyde Hendrick, Texas Tech University

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Madelyn Lockhart, University of Florida
Raymond P. Lutz, University of Texas at Dallas
Mary W. Martin, Middle Tennessee State University
Robert T. Van Aller, University of Southern Mississippi
Bernard T. Young, Angelo State University

WESTERN ASSOCIATION OF GRADUATE SCHOOLS

Officers

Peter Suedfeld, President, University of British Columbia
A. Charlene McDermott, Past-President, City College of the City University of New York
John E. Nellor, President-Elect, University of Nevada-Reno
Dale Comstock, Secretary-Treasurer, Central Washington University
Leland Shannon, Member-at-Large, University of California-Riverside
Karlene Dickey, Member-at-Large, Stanford University

THE CONSTITUTION OF THE COUNCIL OF GRADUATE SCHOOLS

(as revised August, 1987)

1. Name

This organization shall be called the Council of Graduate Schools, hereinafter referred to as the "Council."

2. Purpose

The Council is established to provide graduate schools with a comprehensive and widely representative body through which to counsel and act together.

Its purpose is the improvement and advancement of graduate education. The purview of the Council includes all matters germane to this purpose. The Council shall act to examine needs, ascertain best practices and procedures, and render assistance as indicated; it may initiate research for the furthering of the purpose. It shall provide a forum for the consideration of problems and their solutions, and in meetings, conferences, and publications shall define needs and seek means of satisying them in the best interests of graduate education. In this function the Council may act in accordance with the needs of the times and particular situations to disseminate to the public, to institutions, to foundations, to federal, state, and local governments, and other groups whose interest or support is deemed of concern, information relating to the needs of graduate education and the best manner of satisfying them.

In the analysis of graduate education, in the indication of desirable revision and further development, in the representation of needs and all other functions related to effecting its purpose, the Council not only shall be free to act as an initiating body, but it shall assume direct obligation for so doing.

3. Membership

Membership in the Council of Graduate Schools shall be in the following categories: Regular, Sustaining, and Contributing. All members shall be aware that the Council is devoted to excellence in graduate education as interpreted by occasional position statements outlining philosophies, policies, and procedures of graduate education. Applicants for membership must demonstrate continuing commitment to and support of graduate eduation, and shall display evidence of qualifications as prescribed by the Council. All applications will be reviewed and evaluated by the Council's Membership Committee, which will bring its recommendations to the Executive Committee for action.

A. *Regular Membership.* Institutions of higher education in the United States and its territories and Canada that are significantly engaged in graduate education, research, and scholarship, and the preparation of candidates for advanced degrees are eligible for Regular Membership. Applicant institutions must already have been approved to offer graduate work by the appropriate regional/provincial accrediting authorities, and shall have awarded a total of at least thirty master's degrees or ten doctoral degrees (or combination thereof) in at least three distinct and separate fields or disciplines within the three years immediately prior to the date of application. Applicant institutions must also have a formally organized administrative unit responsible for graduate affairs.

B. *Sustaining and Contributing Membership.* Profit and nonprofit organizations such as research institutes; testing and evaluation corporations; philanthropic and charitable organizations; federal, regional, and state agencies; public and private research and development corporations that are committed to fostering graduate education and research and that support the objectives of the Council may be eligible to become sustaining or contributing members. Such organizations must recognize the value of quality graduate education across a broad range of scholarly, technologial, and creative endeavors. Through their participation and financial contributions they help the Council carry out its central mission and purpose, while gaining access to its resources and activities. Levels of contribution for sustaining and contributing members shall be set by the Board of Directors.

Members in all categories shall be listed (separately and/or so designated) in the CGS Membership Directory, and receive the same generally distributed information and mailings.

Regular, Sustaining, and Contributing Members may attend CGS meetings and other sponsored functions. However, Sustaining and Contributing Members shall not have voting rights nor be eligible to hold elected or appointed offices in CGS. The Council neither endorses nor represents the interests of Sustaining or Contributing Members.

4. **Voting Power**

In all activities of the Council, each regular member institution shall have one vote. More than one representative of any institution may attend the meeting of the Council, but the vote of the member institution shall be cast by the individual designated by the chief administrative officer of the member institution as the principal representative of the institution.

5. **Officers and Board of Directors**

There shall be a Board of Directors of twelve voting members, composed of the Chairman, the Chairman-Elect, the Past Chairman, and nine members-at-large. Three members-at-large shall be elected annually by the members of the Council in the manner specified in Article 8 for terms of three years that begin immediately after the Annual Meeting. CGS regional affiliates are provided formal Board participation as specified in Bylaw 7.

The Chairman-Elect, chosen by the Board of Directors from its own past or present membership, shall serve in that capacity for one year. The following year the Chairman-Elect will assume the office of Chairman, and the following year, the office of Past Chairman. In the absence of the Chairman, the Chairman-Elect shall be presiding officer of the Board of Directors and the Council.

Each voting member of the Board of Directors must be the principal representative of an institutional member of the Council and none may serve for two consecutive full terms.

If the Chairman is unable to continue in office, the Chairman-Elect shall succeed immediately to the Chairmanship, and the Board of Directors shall choose a new Chairman-Elect.

Any vacancy occurring among the membership-at-large of the Board of Directors shall be filled in the manner specified in Article 8. In the interim, the position shall be filled by an appointee of the Board of Directors.

6. **Executive Officers**

The chief executive officer of the Council shall be a President, who shall be a salaried officer, appointed by the Board of Directors and serving at its pleasure. The President shall serve as an ex-officio member of the Board of Directors without a vote.

7. **Duties and Powers of the Board of Directors**

In addition to the duties and powers vested in the Board of Directors elsewhere in this Constitution, the Board of Directors may specifically employ such staff and establish such offices as may seem necessary; incorporate; undertake itself, or through its agents, to raise funds for the Council and to accept and expend monies for the Council; take initiative and act for the Council in all matters including matters of policy and public statement except where limited by this Constitution or by actions of the Council.

8. **Committees**

In addition to the Board of Directors, there shall be an Executive Committee of the Board of Directors, a Nominating Committee, a Committee on Membership (whose members shall not be members of the Board of Directors), and such other standing committees as may be established by the

Board of Directors.

Except for the Executive Committee and the Nominating Committee, all standing committees and ad hoc committees shall be appointed by the Chairman with the advice and consent of the Board of Directors. All committees shall be chaired by regular members of the Council.

The Executive Committee shall consist of the Chairman, Past Chairman, Chairman-Elect, and two other Board members elected annually by the Board of Directors. The President of the Council shall be an ex-officio member of the Executive Committee.

To the extent determined by the Board, the Executive Committee shall have the authority of the Board in the management of the affairs of the Council in the intervals between meetings of the Board. The actions of the Executive Committee shall be reported at the next meeting of the Board of Directors.

The Nominating Committee shall consist of five new members each year, three of whom shall be elected by the members of the Council. Two shall be members of the Board of Directors. The Chairman of the Committee shall be the Past Chairman of the Board. The one other Board member shall be elected by the Board from its members-at-large who are in the last year of their terms.

At least sixty-one days before each Annual Meeting of the Council, the Nominating Committee shall propose to the members of the Council two nominees for each member-at-large position of the Board of Directors to be filled, including residual terms of vacated positions, and two nominees for each member-at-large position of the Nominating Committee. These nominations shall be made only after suggestions accompanied by supporting vitae have been solicited from the membership-at-large.

The election shall then be held by mail ballot and the nominees receiving the larger numbers of votes for the positions to be filled shall be declared elected. In case of a tie vote, the Nominating Committee shall break the tie.

9. **Meetings**

The Council shall hold an Annual Meeting at a time and place determined by the Board of Directors. The Council may meet at other times on call of the Board of Directors.

The Board of Directors shall be responsible for the agenda for meetings of the Council. Reports and proposals to be submitted for action by the Council shall be filed with the Board of Directors before they may be submitted for general discussion by the Council. No legitimate report or proposal may be blocked from presentation to the Council, but action on any proposal may not be taken until the Board of Directors has had an opportunity to make a recommendation.

In matters not provided for in this Constitution, parliamentary procedure shall be governed by Robert's Rules of Order, Revised.

10. **Limitations of Powers**

No act of the Council shall be held to control the policy or line of action of any member institution.

11. **Dues**

The amount(s) of membership dues shall be proposed by the Board of Directors and must be approved by the majority of the membership after due notice.

12. **Amendments**

Amendments to this Constitution may be proposed by the Board of Directors or by written petition of at least one-third of the members. However they originate, proposals for amendments shall be received by the Board of Directors and forwarded with recommendations to the members, in writing, at least ninety days before the meeting at which they are to be voted upon or before formal submission to the members for a mail ballot. To be adopted, proposed amendments must receive the approval of a two-thirds majority of the members voting at the announced meeting or on the designated mail ballot.

13. **Bylaws**

Bylaws may be established by the Board of Directors at any regular or special meeting, subject to ratification by a simple majority vote of the Council at the next Annual Meeting.

BYLAWS

1. In conformity with Article 6 of the Constitution, the President of the Council of Graduate Schools shall be paid an annual salary to be determined by the Board of Directors plus such perquisites as may be necessary for the proper conduct of the office and such travel as may be deemed essential. The President is authorized to employ such personnel as necessary for the proper conduct of the office, to establish bank accounts in the name of the Council of Graduate Schools, and to draw checks and invest monies against the Council's account or accounts, subject to an annual audit of the books of the Council by a Certified Public Accountant and approval by the Board of Directors.
2. Depositories for funds of the Council shall be designated by the Board of Directors.
3. In the event of the dissolution of the Council of Graduate Schools, all then existing assets of the Council shall be distributed in equal parts to the institutions that will at the time be members of the Council.
4. The fiscal year of the Council shall correspond to the calendar year.
5. In the event of the death or disability of the President of the Council, the Chairman shall immediately call a meeting of the Board of Directors to select an Acting President, who shall assume the responsibilities of the President, as they are specified in Article 6 of the Constitution and in Bylaws 1 and 2, until the appointment of a new President.
6. Applications for Regular Membership must include statements endorsed by the chief executive officer and the chief graduate officer of the applicant institution. These statements shall include information as to the following:
   a) The institution's accreditation for graduate work as determined by the appropriate regional or provincial accrediting authority.
   b) The number of graduate degrees awarded in the three years immediately preceding the application for each applicable field or discipline in which graduate degrees are awarded.
   c) A general description of the criteria used in determining faculty participation in graduate programs, i.e., the level of training and the scholarly/creative productivity of the faculty members in the institution's graduate program.
   d) The degree of centrality of graduate education to the nature and purpose of the institution as evidenced by its budgetary commitment to graduate programs, the existence of special facilities or resources in specific support of graduate education, and, in the case of appointments, promotion, and tenure, the degree of importance placed on faculty contributions to graduate and scholarly/creative work.
   e) The extent of the institution's acceptance of existing Council policy statements setting forth standards for the organization of graduate study.

7. A regional organization of graduate schools that becomes associated with the Council of Graduate Schools shall be known as CGS affiliate. Eligibility for CGS affiliate status is limited to a) existing regional organizations of graduate schools, or b) any such organizations subsequently established and having membership of at least fifty institutions. An eligible organization becomes a CGS affiliate upon approval by CGS's Board of Directors of a letter from a duly authorized officer of that organization stating its intent to become an affiliate. No fee is required to become a CGS affiliate.

   Formal participation of the regional associations in CGS is provided by liaison representatives to the CGS Board. Each regional association will designate a member to serve in that capacity. In the event that the liaison representative is already a member of the CGS Board, that individual will serve in a dual capacity. The appointment of a liaison representative does not preclude direct communication between CGS and officers of the affiliates. In determining any joint position held by CGS and its affiliates, the governing bodies of each must have adopted such a position using their own procedures. When agreement has been reached, CGS shall be able to represent the position as one held in common by CGS and its affiliates. Article 10 of the Constitution of CGS shall apply to any such determination.

PROCEDURAL POLICIES

1. Annual meetings of the Council shall be held during or near the first week of December.
2. If a member resigns, it must reapply for admission in the normal way if it wishes to resume membership.
3. Institutions accepted to membership in any given year shall be required to pay prorated dues on a quarterly basis for that fiscal year.

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Alphabetical Listing of Regular Member Institutions

Abilene Christian University
Adelphi University
Air Force Institute of Technology
Alabama A&M University
Alfred University
*American University, The
Andrews University
Angelo State University
Appalachian State University
Arizona State University
Arkansas State University
Assumption College
Atlanta University
Auburn University
Austin Peay State University
Ball State University
Baylor College of Medicine
Baylor University
Bentley College
Boston College
*Boston University
Bowling Green State University
Bradley University
*Brandeis University
Bridgewater State College
Brigham Young University
Brooklyn College of CUNY
*Brown University
*Bryn Mawr College
*California Institute of Technology
California State College, Bakersfield
California State Polytechnic University, Pomona
California State University, Chico
California State University, Fresno
California State University, Fullerton
California State University, Hayward
California State University, Long Beach
California State University, Los Angeles
California State University, Northridge
California State University, Sacramento
California University of Pennsylvania
*Carnegie-Mellon University
*Case Western Reserve University
*Catholic University of America, The
Central Michigan University
Central Missouri State University
Central State University
Central Washington University
Chicago State University
City College of the City University of New York
City University of New York Graduate School & University Center
*Claremont Graduate School, The
*Clark University
Clarkson University
Clemson University
Cleveland State University
College of New Rochelle
College of Notre Dame
College of Saint Rose
College of William and Mary
Colorado School of Mines
Colorado State University
*Columbia University
*Cornell University
Creighton University
Dartmouth College
Drake University
Drew University
Drexel University
*Duke University
Duquesne University
East Carolina University
East Central University
East Tennessee State University

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